JUN 4 1921

S-792-S

2 8, 798

TRANSACTIONS

OF THE

SAN DIEGO SOCIETY

LIBRARY
MUS. COMP. ZOÖLOGY,
CAMBRIDGE, MASS.

OF

NATURAL HISTORY

NOVEMBER 1914

VOL. 2 NO. 1

HEMIPTERA. E. P. VAN DUZEE

MEMOIRS OF MR. HEMPHILL
WITH PORTRAIT

C.

CAMBRIDGE MASS.
THE COPE SCOTTOCK
LIBRARY

JUN 4 1921

A Preliminary List of the Hemiptera of San Diego County, California

By E. P. Van Duzee, Berkeley, Calif.

The Hemiptera enumerated below with few exceptions were taken by me during my residence in that county from December, 1912, to August, 1914. A few, however, were given me by Mr. W. S. Wright and others, and two or three are from localities just outside of the county. The following notes on localities and conditions are given for the benefit of those living in the east who are not conversant with the physical conditions found there.

Coronado and North Island: Low, flat land, lying between the bay and the Pacific ocean.

Ocean Beach, on the northwest side of Point Loma: Collections mostly made on or about the low sand dunes.

San Diego: Mostly in the fields and canyons east of Thirty-first street, on the chaparral at an altitude of about 300 feet, or along Mission Valley near the San Diego River and on the hillsides and in the canyons opening into the valley.

La Jolla, fourteen miles north of San Diego: Mostly about Scripps Institution for Biological Research, near the beach and on the hills and pueblo lands near by, with an altitude of from 300 feet to 800 feet on Mt. Soledad.

Torrey Pines, six miles north of La Jolla on the sandy hills, altitude about 400 feet, or along the valley of the Soledad River. The chaparral collecting here is the best along the coast in this county.

La Mesa, Lemon Grove and Grossmont, east of the city, at an altitude of from 500 to 800 feet. Here Eriogonum prevails in the chaparral and the best collecting is among the rocky hills about Grossmont.

Lakeside, on the San Diego River, about 20 miles east of the city. Here I worked along the river and on the hillsides north of the town. Altitude about 400 feet at the river.

Foster, two miles northeast of Lakeside and but little higher: Work done on the rocky hillsides up to 2000 feet.

Mussey's, a pretty oak-covered valley two miles farther north on the same creek, with much the same conditions as at Foster's, but better collecting ground: Work here was done in the valley and on the rocky hillsides, especially along the canyon to Barona Ranch.

Alpine, thirty miles east of San Diego, among the hills, altitude 1850 feet: Here there was good collecting everywhere in the little valleys and canyons and on the granite hillsides up to 4000

Transactions San Diego Society of Natural History
No. 1 Vol. 2 Oct. 1914

feet. "The Willows," two miles farther east, gives good valley conditions.

Hurlburd Ranch, near Descanso, altitude about 4000 feet, with conditions not very different from those found at Alpine.

"Twin Pines," on the road from Descanso to Julien and at an altitude of about 5000 feet. This was the highest point accessible by road in the Cuyamaca Mountains, and the vegetation was quite different from that found at lower levels; pine, broad-leaved oak, alder and cedar trees and many other more northern species being found here, and the insect collecting was distinctive and good.

Pine Hills, near Julien, altitude 4200 feet, was an excellent collecting ground with some of the mountain vegetation found at the "Twin Pines."

In San Diego County the collecting season for Hemiptera extends over the entire year, but most of the species have their regular season depending perhaps more on the rains than on the altitude of the sun. The greater number appear soon after the rains and are "in season" from March to July, while certain species and straggling examples of others may be found until well into October. In the higher altitudes from Alpine into the Cuyamaca Mountains the season is later. Introduced species on alfalfa and other crops are found throughout the year.

The lower lands near the coast are usually frostless or nearly so, but from about 1500 feet up there may be a few frosts severe enough to injure tomato plants if unprotected and most every winter there is a little snow on the Cuyamaca Mountains which may remain on the ground for a day or two. In the severe freeze of January, 1913, the temperature reached 16 degrees in San Diego city and went as low as 6 degrees in some of the neighboring canyons, but the exceptional severity of this freeze is proven by the fact that rubber trees more than fifty years old were killed to the ground; but even these conditions were local and tender vegetation not far distant would sometimes escape almost untouched.

One from the east is surprised to find that with such a climate there is both hybernation and æstivation among the insects. The principal controlling factor here is the moisture conditions. The rains, amounting to from ten to sixteen inches according to altitude, come during the winter months, from November to April, and this rainy season is the time of green fields and of flowers which appear in marvellous profusion and beauty. The young of many plant-feeding Hemiptera appear during February and March, but certain species occur much later.

On the eastern slope of the Cuyamaca Mountains the fauna partakes more of the desert type, but the little collecting I have done at Buckman's Springs and in Pine Valley was insufficient to indicate the character of that fauna. In addition to the species enumerated in this paper I have taken quite a number that I have been unable to determine with the material and time at my disposal.

I wish here to acknowledge my indebtedness to Mr. W. S.

Wright of San Diego, who has turned over to me many interesting Hemiptera and has given me valuable information respecting collecting grounds, and to Mr. J. L. Rose of Alpine, who has very kindly opened his Alpine home to me, where much of my back-country collecting has been done and which has proven an excellent place for Hemiptera work.

This paper enumerates 392 species or distinct varieties, of which 52 are new, and four new genera are characterized: *Pycnocoris, Platycixius, Oeclidius* and *Rhynchopteryx*.

HETEROPTERA

Family SCUTELLERIDAE

1. *Sphyrocoris punctellus* Stal. Mussey's, April, one example.
2. *Homoemus parvulus* Germ. San Diego and Alpine; April.
3. *Homoemus proteus* Stal. Mussey's, August.

4. *Homoemus variegatus* n. sp.

Allied to *proteus* but much smaller; having much the aspect of *Symphylus albomaculatus* Dist., Length 4-5 mm.

Female: Head shorter and broader anteriorly than in *proteus;* black or bronze black, closely punctured and covered with mottled pale pubescence. Antennæ black, the incisures only pale; second and third joints subequal, fifth slightly longer than the fourth. Pronotum proportionately shorter and broader than in *proteus,* the humeral angles a little more produced and the sides more oblique, coarsely and irregularly punctured; color greyish tinged anteriorly with ferruginous, the surface on either side covered with matted pale hairs; disk marked with irregular oblique blackish rays, the most pronounced of which forms an imperfect M across the middle of the disk and includes an abbreviated white medium longitudinal line; on the anterior margin before this dark mark is a pair of roundish black spots. Anterior half of the narrowly rounded lateral margins white, posterior half black. Scutellum shorter and broader than in *proteus,* grey, distinctly punctured with black and varied with blackish arcs; on either side of the base is a white arcuate line ending in a marginal spot of the same color and between which is a vague paler area. These pale marks are really formed by a whitish transverse band across the middle partially interrupted by a transverse brown cloud and two oblique blackish rays; posterior one half largely blackish marked with a triangular whitish apical spot and an obscurely triangular cloud either side. Elytra as in *proteus,* grey and punctured, the costa dotted with black posteriorly and the surface under the scutellum black. Beneath pale along the middle line with a blackish area on either side of the disk, the submargins being ferruginous or castaneous. Middle of the venter with but few black punctures and clothed with a minute pale pubescence. Femora piceous black, pale at base and tip, with a rufous spot beneath; tibiæ and tarsi castaneous, the former piceous within, the latter black at apex. Osteolar canal less curved than in *proteus;* margins of the connexivum var-

ied with black and pale. Rostrum black reaching the hind coxæ.

Male smaller and narrower than the female, the markings much obscured, the scutellum with indications only of the white lateral spots and pale median line, the whitish arcuated basal lines distinct.

Described from numerous examples taken about San Diego on the chaparral. During the spring of 1913 it was abundant but the present season I have seen but few. Females living on the red manzanita bushes become clear castaneous with the characteristic markings much broken and obscured, the clearly marked grey forms were taken on the Adenostoma where their color harmonizes perfectly with their surroundings.

5. *Eurygaster alternatus* Say. Mussey's, Alpine; April to August.

Family CYDNIDAE

6. *Thyreocoris nitiduloides* Wolff. Alpine, on adobe soil, March to June.
7. *Thyreocoris montanus* Van D. Fosters to Alpine, May to October.
8. *Thyreocoris extensus* Uhler. April to October, common, especially at Alpine.
9. *Macroporus repetitus* Uhler. Mussey's, one example taken near a brook in April 1914.
10. *Homaloporus congruus* Uhler. San Diego, May to August, young in August. Taken by Mr. W. S. Wright.
11. *Aethus conformis* Uhler. La Jolla, June, one example.
12. *Pangaeus discrepans* Uhler. San Diego, May, one example taken by Mr. Wright.
13. *Geotomus parvulus* Sign. February to April. Occasional.

Family PENTATOMIDAE

14. *Brochymena quadripustulata* Fabr. Occasional on trees and bushes throughout the year.
15. *Brochymena affinis* Van D. Pine Hills, October, on pine.
16. *Peribalus abbreviatus* Uhler. Mussey's and Alpine; April to August.
17. *Rhytidolomia faceta* Say Salt flats at Torrey Pines, June.
18. *Chlorochroa ligata* Say. La Jolla, September. Also taken on mustard at San Juan Capistrano in June 1914.
19. *Chlorochroa sayi* Stal. July to October; not common.
20. *Carpocoris remotus* Horvath. Alpine, October. One example taken on a Boragonaceous plant.
21. *Euschistus conspersus* Uhler. March to April.
22. *Cosmopepla uhleri* Montd. Alpine and Mussey's, April. From chaparral on dry rocky hillsides.
23. *Thyanta custator* Fabr. Common everywhere. During aut-

umn and winter a green form wanting the red band is common in alfalfa fields.

24. *Thyanta brevis* Van D. Lakeside, October. Taken in numbers from a low Chenopodium growing along the river.

25. *Murgantia histrionica* Hahn. Common everywhere on mustard and on "bladder pod," the latter of which seems to be its native food plant here. It varies widely in color and an unusually dark individual has been described by Prof. Cockerell as var. *nigricans*.

26. *Nezara hilaris* Say. Common.

27. *Dendrocoris pini* Montd. Pine Hill, October; several taken from pine trees.

28. *Podisus pallens* Stal. Common throughout the year. This species is very close to *maculiventris* Say but the black ventral spots are much reduced and the form of the genital pieces is different.

29. *Zicrona caerulea* Linn. Alpine and elsewhere, July, on Eriogonum.

Family ARADIDAE

30. *Aradus falleni* Stal. Mission Valley, San Diego, July.

Family NEIDIDAE

31. *Neides muticus* Say. April to October; not uncommon.

32. *Jalysus spinosus* var. *wickhami* Van D. April to October, occasional.

33. *Acanthopysa echinata* Uhler. Lakeside and Alpine, May to July. This species inhabits a low spiny plant growing on dry granite soils among the bristly flowers and fruit of which it is wonderfully well concealed by its own spiny surface.

Family COREIDAE

34. *Corynocoris distinctus* Dallas. Alpine, July and October. These do not differ from eastern specimens. I hardly think this species can be differentiated from *typhoeus*.

35. *Narnia pallidicornis* Stal. Abundant on cacti, especially the "plate cactus,' from March to October.

36. *Narnia (Xerocoris) wilsoni* Van D. Not uncommon about La Jolla in August on the melon cactus or "nigger head." Also Lemon Grove, February.

37. *Chelinidea tabulata* Burm. Found on stag-horn cactus or Chollas, throughout the year. These western specimens show a strong tendency to darkening of the legs and antennæ, thus exhibiting a decided approach to *vittigera* which may not be distinct.

38. *Ficana apicalis* Dallas. Common in many localities; about half of the specimens have the connexivum immaculate but they do not seem to represent a distinct species.

39. *Dasycoris humilis* Uhler. El Cajon, May, one example.

40. *Darmistus subvittatus* Stal. Alpine, June; one example.

41. *Alydus pilosulus* H. S. Lakeside, October, from the flats by the river.

42. *Tollius setosus* Van D. La Jolla and National City, June.
43. *Harmostes reflexulus* Say. Common and very variable.
44. *Harmostes fraterculus* Say. Mussey's, April 1914. 3 examples.
45. *Aufius impressicollis* Stal. April to October; occasional.
46. *Corizus (Liorhysus) hyalinus* Fabr. Common everywhere.
47. *Corizus (Arhyssus) validus* Uhler. Found in great numbers on a weed, probably a Chenopodium, growing on the flats at Mussey's in October.
48. *Corizus (Arhyssus) lateralis* Say. What seems to be a red form of this species occurs in numbers on Eriogonum from April to July.
49. *Corizus (Arhyssus) scutatus* Stal. Alpine, June, 1913, four examples.
50. *Corizus (Arhyssus) indentatus* Hambl. Coronado and Sweetwater Valley, June.
51. *Corizus (Stictopleurus) crassicornis* Linn. Hurlburd's Ranch, Descanso, October.

Family LYGAEIDAE

52. *Oncopeltus fasciatus* Dallas. June to October; common on the narrow leaved milkweed. Young in July.

53. *Oncopeltus sanguinolentus n. sp.*

Proportionately more slender than our other species; sanguineous, head in part, antennæ, legs, and membrane black, the latter with a transverse white spot. Belongs to Stal's section "a." Length 11 to 13 mm.

Narrower and more elongated than in most species. Pronotum less depressed than in *varicolor,* its nearest ally, sides straight, terete, the adjacent disk little depressed, behind the broad anterior margin more distinctly so; this area bounded behind by two crescentic impressed lines pointing forward. Median carina prominent across this depressed area. Posterior margin on either side of the scutellum compressed and foliaceous. Surface especially of the head and pronotum distinctly hairy as in *varicolor.* Scutellum strongly convex and carinate. Elytra but little widened toward their apex. Membrane long and narrow, surpassing the abdomen by not more than half its length beyond the tip of the corium. Antennæ about as in *fasciata,* shorter than in *varicolor;* first joint surpassing the tylus by hardly half its length. Rostrum, second joint distinctly longer than the third.

Color a uniform sanguineous marked with black as follows; antennæ, legs, rostrum, apex of the tylus, a band on the base of the vertex triangularly interrupted in the middle, the cresentic impressed lines on the pronotum and sometimes a cloud between them, scutellum, or at least its base mesosternum and the membrane. The extreme tip of the abdomen is more or less fuscous and usually the disk of the meso and meta-pleura are blackish and normally there is a black spot on the middle of the costal margin of

the elytra which may be continued in a transverse band entirely across the disk. Before the middle of the membrane is a transverse white mark like that found in *gutta*, and the less mature examples have the basal angles pale.

Described from three male and four female examples taken in Mission Valley within the city of San Diego, early in July, 1913, by Mr. W. S. Wright and the author. All were found on flowers of the milkweed. This conspicuous insect is readily distinguished from any variety of *varicolor* by the characters of the pronotum and the short basal joint of the antennæ.

54. *Lygaeus reclivatus* Say. Found everywhere on Asclepias.
55. *Lygaeus belfragei* Stal. San Diego, January 1913.
56. *Lygaeus melanopleurus* Uhler. Alpine and Mussey's; March to October.

57. *Lygaeus carnosulus* n. sp.

Very close to *lineola* Dallas but differs in being smaller and more clearly marked. Length 4 to 4½ mm.

Color black, uniformly sericeous pubescent giving the insect a greyish look; membrane deep black. Narrow comissural margin of the clavus, hind edge of the corium and apical margin of the membrane more broadly, white; bucculæ, antennal sockets, broad anterior margin of the prosternum and coxal cavities, narrow margins of the meso- and meta-pleura and apex of the orifices, whitish. Pronotum mostly marked with pale sanguinous as follows, a subquadrate median spot on the posterior lobe and a smaller one on each humeral angle, the latter invades the outer field of the propleura and is continued along the side as far as the eye; the anterior margin has a pale line behind each eye and a dot on the middle which may be continued as a vitta to the basal spot. Costal margin pale sanguineous, more broadly so toward the base where it invades the main nervures of the corium, sometimes almost to their apex; apical half of the scutellum with a pale carina continuing the commissural line. Narrow margins of the abdomen whitish.

Described from numerous examples swept from goldenrod at Lakeside, San Diego County, California, October 2, 1913.

This species is very close to *lineola* of which it may be but a geographical race but the black surface is more sericeous, the pale inner and apical margins of the elytra are white, the costa and pale markings of the pronotum are sanguineous and the color on the costa invades the nervures which is not the case in *lineola*. The markings of the pronotum are quite distinct. The pale point on the base of the vertex is very minute but discernable, and there are slender impressed nude lines on the pronotum and on either side of the median carinæ of the scutellum.

58. *Lygaeus bicrucis* Say. Alpine, June 5th, 1913, one example.
59. *Lygaeus lateralis* Dallas. Coronado, June; one example.
60. *Belanochilus numineus* Say. Numbers of larvæ and one adult taken from sycamore balls at Alpine in January, 1914.
61. *Ortholomus longiceps* Stal. July to October; abundant.

62. *Ortholomus arphanoides* Baker. Found commonly on the flower heads of the black sage during May and June.

63. *Ortholomus nevadensis* Baker. Lakeside and Alpine, May and June.

64. *Nysius californicus* Stal. Not uncommon at La Jolla and Torrey Pines from March to July. These are mostly of the dark form erroneously determned as *providus* by Baker. I consider them scarcely worthy of a varietal name.

65. *Nysius strigosus* Uhler. Alpine and Mussey's; June to August.

66. *Nysius ericae* var. *minutus* Uhler. Common everywhere and at all times.

67. *Ischnorhynchus franciscanus* Stal. Common on chaparral from March to October. This is a good species quite distinct from the eastern form.

68. *Arphanus coriacipennis* Stal. Occasional in swampy spots. Abundant at Grossmont along the flume where the leakage supports a rank growth of grasses. May.

69. *Geocoris bullatus* var. *pallens* Stal. Common everywhere in suitable places from March to October.

70. *Geocoris decoratus* var. *solutus* Montd. Taken at Mussey's in August and at Hurlburd's Ranch near Descanso in October. I question the validity of this variety. It is too near *pallens*.

71. *Geocoris punctipes* Say. San Diego, February; one example.

72. *Geocoris howardi* Montd. Not uncommon; March to October. This form is quite variable in color, the elytra becoming at times almost entirely black, the costal margin only pale, and the sides of the pronotum toward the humeri may be broadly pale. Mr. McAtee considers it synonymous with *uliginosus* var. *speculator* but if Mantondon's description can be depended upon it seems sufficiently distinct.

73. *Crophius scabrosus* Uhler. Taken in numbers from a low composite flower growing about the spring house at Buckman's Springs, in October. These Springs are east of the Cuyamaca divide where stragglers from the Arizona fauna might be expected. There were no cedar trees in sight.

74. *Phlegyas annulicrus* Stal. April to June, on dry hillsides.

75. *Heraeus nitens* n. sp.

Larger than *plebejus*, piceous brown, highly polished. Length 7 mm.

Head impunctate, ovate, proportionately larger and more convex than in *plebejus*, longer and more convexly narrowed behind the eyes which are small and placed near the middle of the head; anteocular portion more rounded with the tylus narrow and prominent, exceeding the apex of the cheeks by rather more than its own width; ocelli small, on a line with the hind angle of the eyes separated by more than twice their distance from the eyes. An-

tennæ slender; basal joint exceeding the tip of the tylus by one half its length; much thicker at apex; second joint longest, one and one half times the length of the first; third three fourths the length of the second; fourth nearly as long as the second, fusiform; all the joints but the first minutely hairy. Rostrum reaching to between the intermediate coxæ; first joint surpassing the hind angle of the eye, second attaining the anterior coxæ. Pronotum distinctly shorter than the head and shorter than its basal width; anterior lobe strongly convex, smooth and polished above; posterior as long as the anterior, polished, with coarse distant punctures, the middle line slightly raised and smooth; humeri prominent, smooth and subtuberculate, hind edge straight. Scutellum long and acute at apex, punctate, with a smooth median line on its apical two thirds. Elytra polished, punctate, the claval punctures fewer and less confused than in *plebejus.*, Pleural pieces strongly punctured. Anterior femora much incrassated with eight or ten teeth, the middle ones much longer. Venter impunctate, scarcely polished; no lunate vitta.

Color piceous brown becoming almost black on the pronotum, scutellum and pelural pieces; head rufopiceous; elytra verging into fulvopiceous in places, the costal margin narrowly paler, with an indication of the paler square anteapical spot found in *Ligyrocoris contractus* and other allied forms. Antennæ, at least the second and third joints, and the legs flavo-piceous, all the femora with a subapical blackish cloud which seems to be wanting on the anterior femora of the male.

Described from one male and two female examples taken at Alpine, March 11th, 1914. These were swept from grass and weeds on the high adobe lands south of the village. I have one larger female that was taken by Prof. J. C. Bradley at Leona Heights, Alameda County, California, in August.

76. *Ligyrocoris nitidulus* Uhler. Alpine and La Jolla, July. I have sent my specimens to Mr. H. G. Barber who is monographing the genus.
77. *Ligyrocoris percultus* Dist. Grossmont, April.
78. *Rhyparochromus sodalicus* Uhler. Found in great numbers on low grasses and weeds at the head of a coast canyon on the Pueblo lands north of the Scripps Institution at La Jolla in March. A few taken at Mussey's in April.
79. *Peritrechus fraternus* Uhler. Coronado, June.
80. *Peritrechus tristis* Van D. Alpine, April; one example.
81. *Sphragisticus nebulosus* Fallen. Occasonal. Comes to lght at night.
82. *Petissius sp.* Alpine, April; one example.
83. *Emblethis vicarius* Horvath. La Jolla, found occasionally running on the paths at Scripps Institution, February to August.

84. *Eremocoris wrighti* n. sp

More slender than our other species; rufo-piceous, antennæ pale at base. Length 6 mm.

Head thorax and scutellum dark castaneous becoming more rufo-piceous beneath and on the elytra. Pronotum oblong, not narrowed anteriorly, the anterior angles depressed and rounded; the carinate margins broad and pale; anterior lobe impunctate; posterior narrow, punctured, paler with two oblique discal vittæ and the slightly elevated humeri blackish, the latter bordered by the foliaceous carinæ. Scutellum small, scarcely punctate. Base of the elytra a little paler, shading darker on the clavus and posteriorly, the dividing line ill-defined and located a little before the tip of the scutellum. Membrane little developed in the type, concolorous. Vertex piceous-black, polished, minutely sericeous. Legs fulvo-testaceous. Anterior femora piceous, apical spur long, posterior wanting, the smaller denticulations scarcely discernable. Posterior femora piceous on their apical half. Antennæ rufo-testaceous; apex of the second joint, all the third and the base of the fourth blackish. Hind tibiæ smooth, the basal joint of its tarsi fully twice the length of the two apical.

Described from one male taken in San Diego city, February 9, 1913, by Mr. W. S. Wright, a student of the Lepidoptera to whom this species is dedicated as a mark of friendship and appreciation of his entomological zeal and every ready assistance in working out the Hemipterous fauna of this county.

85. *Eremocoris inquilinus* n. sp.

A large black species with the clavus, corium and base of the membrane a clear rufous brown. Length 7 mm.

Antennæ and head black, the former touched with pale at the incisures. Pronotum regularly narrowed anteriorly as in *ferus;* anterior lobe dull black, impunctate with the usual median impressed point; collum distinguished by a row of deep punctures; posterior lobe flat, dull black, punctate, the punctures dragged anteriorly and near the middle; slightly tinged with castaneous about the humeri; carinate edges castaneous, but feebly arcuated. Scutellum dull black, punctured, rather deeply impressed and a little wrinkled across the disk. Elytra uniformly rufous-brown, the membrane black except the basal margin and angle. Beneath and legs black, a little shining but scarcely polished; narrow anterior edge of the prosternum, posterior angles of the propleura, hind margin of the metapleura, edges of the coxal cavities, knees, apex of the tarsi, of the rostrum and of the oviduct of the female, tinged with rufous. Anterior femora with about six small teeth, the basal spur much smaller than the apical but distinctly larger than the small denticulations; hind tibiæ smooth except for a very minute pubescence. Mesosternal groove narrower and rather deep.

Described from two male and three female examples taken from nests of the wood rat by Mr. W. S. Wright and the writer on May 10th, 1913, in the canyons east of San Diego city.

86. *Scolopostethus tropicus* Dist. San Diego, Fosters and Grossmont, May.

Family PYRRPOCORIDAE

87. *Largus cinctus* H. S. Not uncommon on bushes and trees. These are darker than the typical *cinctus* and may prove to be *convivus* Stal. The young of this species were described by Kirkaldy as the young of *Stiretrus anchorago*, a Pentatomid!

Family TINGIDIDAE

88. *Piesma cinerea* Say. May to August; not uncommon. Sometimes of a greenish white color but such paling is quite characteristic of the arid regions.
89. *Corythucha fuscigera* Stal. San Diego, May; on chaparral.
90. *Corythucha marmorata* Uhler. Alpine, October; on a wild sunflower, perhaps a Hieracium. Also taken in June. A third species of this genus inhabits the mountain balm and a fourth the Heteromeles but I have not had time to work these out.
91. *Gargaphia opacula* Uhler. Lakeside and Mussey's, August to October. Abundant on willows along the river.
92. *Physatochila plexa* Say. Lakeside, October; one example.
93. *Teleonemia nigrina* Champ. April to October; common on a yellow flowered Leguminose plant allied to alfalfa, also found on Rhus laurina.

Family PHYMATIDAE

94. *Phymata erosa parva* Handl. Common on Eriogonum and other flowers. As I determine this subspecies it is a small strongly marked form with the sides of the pronotum but little emarginate and the humeral angles more rounded, not strongly prominent.
95. *Phymata erosa severini* Handl. Common. June to October. This is a small form like the preceding but the humeral teeth are more prominent with the pronotal sides more deeply notched. The colors are paler in this form but the males are clearly marked with a black band across the abdomen, another across the humeri and a dot on the margins of the pronotum anterior to the sinus. It is our most common form.

96. *Phymata erosa arctostaphylae* n. subsp.

Very close to *fasciata* Gray, a little larger, sides of the abdomen more strongly angled, the humeri more produced, almost alate, the anterior teeth much more prominent than the posterior; the submarginal posterior carina distinct; apical lobes of the head longer and more pointed. Color dark mahogany brown with indications of the transverse black bands across the broadest part of the tergum and on the hind margin of the pronotum; beneath clear red, almost sanguineous. Length 9 mm. greatest breadth of the abdomen 5 mm.

Characterized from a single female beaten from a bush of the broad-leaved mountain Arctostaphylos, or manzanita, near Morena

Dam in October 1913. The most interesting character of this insect is its remarkable color adaption, harmonizing exactly with that of the bark on which it rests.

97. *Macrocephalus cimicoides* Swed. Alpine, June; one example taken on the dry granite hill sides.

Family REDUVIIDAE

98. *Ploiariola californica* Baker. San Diego and Coronado, June and July.

99. *Ploaria californiensis* Baker. Mussey's, August; one example.

100. *Oncocephalus nubilus* n. sp.

Most nearly allied to *cincticrus* Reut. from Africa. Basal joint of the antennæ bald above; testaceous with a dorsal fuscous cloud. Length 18 mm.

Head normal, unarmed beneath; anteocular portion equal to the postocular and eyes together; post-ocular portion gibbous and abruptly narrowed behind, strongly elevated about the ocelli; armed beneath on either side behind the eyes with three porrect stiff bristles and there are about three on the tubercular antennal sockets. Basal joint of the antennæ thickened toward the apex, bald above, below and on either side armed with long stiff bristle-like hairs as is the entire second joint, these becoming shorter toward the apex; second joint one half longer than the first; third shorter than the first. Rostrum with the first joint sub-equal to the second, the apical only fuscous. Pronotum unarmed on the disk and humeri, the anterior angles with a blunt tubercle; disk with the two median carinæ distinct, the humeri prominent, sharply right-angled; sides obtusely carinate; prosternal tubercles short and blunt. Scutellar spine long as in *geniculatus* and the characters of the legs and elytra as in that species.

Color pale testaceous; a broad dorsal fuscous cloud is narrowed to a point at the anterior margin of the pronotum and is deepened almost to black on the posterior disk of the pronotum, covers the scutellum except the pale apical spine and its basal carina, and is dispersed over the elytra where it omits the broad base of the costa and becomes obscurely dotted with pale posteriorly. Eyes, tumid base of the head, its lower surface and a line behind the antennæ, black. Antennæ infuscated with the incisures and hairs paler. Legs marked as in *geniculatus;* femora fuscous at apex, the posterior with a broad median annulus; tibiæ with the base and apex and a median annulus fuscous, the annulus on the posterior displaced to near the base. Margins of the connexivum with a black line near the base of each segment.

Described from a single male taken by Prof. F. H. Snow on the San Bernardino Ranch, Cochise County, Arizona in August, at an altitude of 3750 feet. What I believe to be the immature female of this species occurred in numbers with its dark fuscous larvæ all over, with the dorsal fuscous cloud less defined, and the elytra nymphs differ in being darker and more or less clouded with brown under stones on the adobe lands at Alpine, April 22, 1913. These

which just pass the middle of the tergum, infuscated and pale-irrorate, the antennæ want the long hairs.

101. *Conorhinus protractus* Uhler. Common in nests of the wood rat.

102. *Rasahus thoracicus* Stal. Common in houses about lights from July to October. It bites severely when carelessly handled. I can see no object in uniting this form with *biguttatus* Say.

103. *Apiomerus crassipes* Fabr. Common everywhere on flowers from May to October. As found here this species is black with the anterior coxæ femora below and sometimes a subapical annulus, an annulus near the base of the anterior tibiæ and the base of the costa sanguineous; connexivum and hind margin of the pronotum narrowly pale. The species shows little tendency to variation here.

104. *Diplocodus exsanguis* Stal. Alpine, October. There is no occasion for uniting this with *luridus* Stal.

105. *Pindus socius* Uhler. Common from March to October.

106. *Rhynocoris ventralis* var. *femoralis* n. var.

This variety differs from the typical *ventralis* in being soiled testaceous where that is red, although it may become fulvous on the legs and antennæ or even tinged with sanguineous. The antennæ are of an obscure testaceous; the legs are black with a quadrate spot on the lower surface of the femora, and the tibæ except at base, pallid. The coriaceous portion of the corium is a clear testaceous.

Described from three females taken on the dry granite hillsides at Lakeside in May and at Alpine in June.

Variety *americanus* Bergr. is very close to the typical *ventralis* but has the red a little more extended. Another variety from Felton, California, in my collection is very near *femoralis* having the same testaceous color but in this the anterior lobe of the pronotum and the legs are soiled testaceous, the latter with the apex of the femora, the base and apex of the tibiæ and a subapical annulus on the hind femora black. The single female specimen was taken by Dr. J. C. Bradley in the foot hills of the Santa Cruz mountains in March 1907. It may be called (107) var. *annulipes*. The typical *ventralis* seems to be more common in Colorado and Utah although I have one example taken at Pasadena, California, by Mr. Fordyce Grinnell in July.

108. *Pselliopus spinicollis* Champ. Taken frequently on a low bush which has a remarkably strong sickening odor, from March to August. I have been unable to determine this shrub which rarely grows more than two feet in height. It has much the aspect of a Solanum but may be more nearly allied to Arctostaphylus. The leaves are small and linear.

109. *Heza similis* Stal. One example taken June 18th, 1913, from a live oak tree in the Sweetwater Valley. It has not before been recorded from our territory.

110. *Acholla tabida* Stal. Coronado, June.
111. *Sinea diadema* Fabr. July to October; common.
112. *Sinea complexa* Caud. Alpine and El Cajon, April and May. Apparently rare.
113. *Sinea rileyi* Montd. Common from March to October, generally of a dark chestnut brown color.

Family NABIDAE

114. *Nabis (Hoplistoscelis) crassipes* Reut. Lakeside and Lemon Grove. May and June, brachypterous form only.
115. *Nabis (Nabis) ferus* Linn. Common throughout the year especially in alfalfa fields.

Family ANTHOCORIDAE

116. *Piezostethus flaccidus* n. sp.

Near *cursitans* but larger and with the elytra almost entirely pale. Length 2½ mm.

Head black, polished. Antennæ black, the apical two joints a little paler, third and fourth joints subequal, each shorter than the second. Rostrum attaining the intermediate coxæ, testaceous. Pronotum black, impunctate; anterior lobe polished, posterior transversely rastrate on the disk, the hind margin but feebly arcuated. Scutellum polished, impunctate. Elytra impunctate, entirely polished, pale soiled testaceous, a little darkened on the clavus and cuneus; the tip of the clavus, hind margin of the cuneus and its exterior nervure embrowned; cuneus otherwise concolorous. Membrane clear hyaline, immaculate. Beneath deep black, mostly polished, the female ovipositor only ferruginous. Osteolar canal long, distinct, broadly curved at apex and ending abruptly just before the anterior margin of the metapleura. Femora black, tibiæ and tarsi brownish-testaceous.

One brachypterous example evidently belonging here has the female ovipositor black and the elytra testaceous, reaching on to the second segment of the tergum with the clavus and cuneus black.

Described from one macropterous female taken at Hurlburds Ranch near Descanso on October 16, 1913, and one brachypterous female captured at Alpine, June 20, 1913.

117. *Anthocoris antevolens* White. Lakeside, May; one example.

118. *Anthocoris ornatus* n. sp.

Structurally nearest *gallarum-ulmi* of Europe; black, elytra before the cuneus and the legs a rich chocolate brown; membrane black with a large white spot on either side. Length 3½ mm.

Head rufo-piceous shading to black above between the eyes. Antennæ rufous with the first joint and apex of the second and third black. Rostrum black attaining the anterior coxæ. Pronotum rufous or rufo-piceous becoming black on the disk above; surface transversely rastrate excepting for some smooth areas on the anterior lobe; hind margin transversely excavated, scarcely arcuated. Scutellum rastrate. Elytra impunctate; em-

bolium, cuneus and apex of the corium beyond the tip of the clavus polished, the rest of the corium and the clavus opake; clavus, embolium and opake portion of the corium chocolate or rufus-brown; cuneus and apex of the corium black. Membrane black with a broad transverse white vitta at the apex of the cuneus, interrupted in the middle. Beneath black, the disk of the ventral segments rastrate; propleura and legs rufous. Osteolar canal distinctly elevated, the apex a little bent forward.

Described from two females taken at an altitude of about 5000 feet in the Cuyamacas in October 1913. Two damaged specimens that seem to belong here were taken by Dr. J. C. Bradley at Felton, Calif., in September and at Sisson, Calif., in August, 1908. This pretty species runs to "11" in Reuter's key.

119. *Triphleps tristicolor* White. April to August; not uncommon.

120. *Scoloposcelis discalis* n. sp.

Closely allied to *flavicornis* Reut. but shorter and broader with the disk of the elytra conspicuously white. Length 2¼ mm.

Black. Head and pronotum polished, the posterior disk of the latter a little transversely depressed and roughened. Antennæ testaceous brown, basal joint black, reaching the apex of the head; second stout, clavate, as long as the width of the head across the eyes; third and fourth very slender, subequal, together hardly longer than the second. Rostrum pale, attaining the anterior coxæ. Scutellum black, polished on the base, transversely depressed before the apex. Elytra white, when closed showing the hylaline colors of the wings beneath; scutellar and commissural margins of the clavus, embolium and cuneus black. Membrane hyaline white. Beneath and legs black, the tibiæ, tarsi and oviduct of the female flavo-testaceous. Osteolar canal long, subangularly curved at about its middle, its acute apex almost reaching the anterior angles of the metapleura.

Described from 1 female and five males taken from under the loose bark of a rotting cottonwood log at Lakeside, October 2, 1913. This species is near *flavicornis* but its broader form, shorter second joint of the antennæ and its smaller size will distinguish it. The inner angle of the cuneus is entirely black in this species.

Family CAPSIDAE

121. *Phytocoris vau* Van D. Taken occasionally on Adenostoma from May to July but it does not seem to be common here. It is a pretty green insect with black clavus and dark castaneous legs and antennæ.

122. *Phytocoris rufoscriptus n. sp*

Form and aspect of *puella* but much larger; soiled whitish-yellow, the elytra and hind femora quite uniformly inscribed with sanguineous. Length 7 mm.

Head produced as in *cunealis*. First joint of the antennæ linear, not thickened toward the base as in *puella*, clothed with white hairs which are distinctly longer than the thickness of the joint.

Elytra almost parallel, a little widened apically. Hind femora just about attaining the apex of the membrane. Wall of the sinsitral notch of the male genital segment vertical and produced above in a prominent tooth directed backward thus giving the notch an almost circular outline.

Color pale straw yellow more or less obscured in places. Head marked with two spots on the base of the vertex between the eyes and two on either side beneath pale sanguineous. Pronotum with the collum and some marks behind it pale sanguineous, the hind submargin with a line of black points, more or less confluent, which probably carry black hairs when freshly excluded. Scutellum clouded with fulvous on the disk on either side. Elytra including the cuneus quite uniformly inscribed with sanguineous with some darker flecks along the costa and a conspicuous black point at the inner angle of the cuneus. Membrane fuscous, uniformly irrorated with pale and with two larger pale spots beyond the tip of the cuneus, the nervures mostly sanguineous. Sternum smooth and blackish between the anterior and intermediate coxæ; hind femora with sanguineous irrorations on the apical two-thirds which become darker and segregated into about three incomplete transverse vittæ beneath; hairs on the hind femora and tibiæ long and black. Abdomen dusky in places, especially on the venter and base of the genital segment.

Described from five males and one female, taken near Alpine Heights, June 8th, 1913, and Mussey's, April 13th, 1913. Also taken at Alpine in June, 1914. This species bears the same relation to *puella* that *cunealis* does to *infuscata*.

123 *Phytocoris cunealis* n. sp.

Form and aspect of *infuscata* but much larger; rufous-brown and straw-yellow shaded with sanguineous, base of the cuneus clear yellow its apex sanguineous. Length about 7 mm.

Head viewed from before conspicuously larger than in *infuscata*, the eyes occupying scarcely more than one half its length; pronotum a little longer; elytra proportionately broader and more widened apically; hind femora distinctly longer, a little surpassing the apex of the elytra. Basal joint of the antennæ linear, not thicker at base than at apex as in *infuscata* and longer in proportion to the second joint. Wall of the sinistral notch of the male genital segment vertical and distinctly thickened, with a prominent rounded tubercle above. In *infuscata* this wall is a little oblique and rounded off above without a tubercle, while in *puella* and its variety *confluens* this wall is cut off obliquely nearly from its base.

Color when mature a rufous-brown, more or less tinged with straw-yellow and becoming sanguineous in places; antennæ, rostrum, legs including the acetabulæ, nearly white. Head and scutellum pale yellow, the former clouded with sanguineous on the sides and more faintly above, the base pale, the latter marked with fulvous on either side toward the apex, the basal lobe beneath the pronotum dark reddish brown. Antennæ becoming infuscated on the apical joint; basal joint with long pale hairs. Pronotum some

shade of rufous-brown becoming pale yellow behind the vertex and marked with a fuscous line before the hind margin; this margin with a line of silvery scales which may be continued well around the humeri. Elytra obscure brown on the basal half, sometimes washed with pale along the claval suture and more or less distinctly irrorated; this brown area darkened behind where it is cut off obliquely to the apex of the scutellum and is followed by a whitish area, the apical half of the corium paler and more obviously irrorate with sanguineous and flecked with whitish on the costal and apical margins; basal half of the cuneus lemon yellow, the apical half sanguineous; tip of the clavus and two points on the margin next the membrane fuscous. Membrane infuscated, quite evenly irrorate with white and with two larger white spots beyond the tip of the cuneus, the nervures largely sanguineous. Sternum darker between the anterior and intermediate coxæ. Venter dull sanguineous becoming yellow toward the apex and a little infuscated on the venter in the female. Hind femora dark sanguineous, paler at base; apex more or less distinctly irrorate; hind tibiæ with a broad fuscous annulus near its base.

Described from numerous examples taken on oak bushes at all places where I have collected, April to June. When immature the colors are paler but the pattern of marking which is much like that of *infuscata* is always distinct. I consider Reuter's var. *infuscata* of *puella* a distinct species as it is constant in its characters and the form of the male genital segment is characteristic and distinctive, while *puella* and its other variety *confluens* are similar.

124. *Phytocoris eximius* Reut. A form that seems to belong here is fairly common from April to October. A number of other closely allied forms also occur here which I have not had the time to work out.

125. *Phytocoris jucundus* n. sp.

Aspect of *cunealis* but smaller and more rufous, larger than *infuscata*. Length about 8 mm.

Head of the same form as in *infuscata*, whitish with rufous irrorations which are few on the disk of the vertex. Basal joint of the antennæ proportionately shorter and thicker than in *infuscata*, as long as the pronotum and head to the base of the antennæ, a little thicker toward its base; armed with a few stout bristles; dark rufous irrorate with paler; second join nearly three times the length of the first, linear, infuscated, with a broad pale medium annulus and a narrow one on the base; third and fourth together more slender and about as long as the second, the apical blackish. Rostrum just passing the hind coxæ, pale, becoming black at apex. Pronotum as in *infuscata;* dull rufous, paler on the disk; slender hind edge pale, set off by a row of black scales; surface clothed with soft pale hairs and deciduous black bristles. Scutellum a little more convex and polished than in *cunealis*, rufous with a pale tip. Elytra as in *infuscata*, obscure rufous with the base and a transverse vitta pale, the latter but very little oblique and indefinite posteriorly, the suture of the cuneus also pale, the

rest of the cuneus clear rufous with two black points on the inner edge. Membrane infuscated, variously irrorated with pale or at times mostly hyaline, the nervures red. Beneath and legs rufous, paler on the coxal region and base of the femora; tibiæ with three pale annuli; the posterior pair pale with two broad fuscous bands; femora, especially the posterior, irrorate with dark rufous, with a few scattering dark bristles. The whole upper surface is clothed in places with deciduous white scale-like hairs when fresh.

Described from numerous examples beaten from pine trees at Pine Hills in the Cuyamaca Mts. at an altitude of 4200 feet, Oct. 19th, 1913. This species has much the pattern of marking found in *cunealis* but the medium pale elytral band is much less oblique than in that species.

126. *Phytocoris reuteri* n. sp.

Form and aspect or *roseus* Uhler nearly, but of a testaceous-yellow color; slender, the elytra long and parallel marked with fuscous. Length 6-7 mm.

Head long, almost vertical; tylus prominent, convex; vertex obsoletely striate, as wide as the eyes in the male, wider in the female. Pronotum long, strongly narrowed anteriorly. Elytra much longer than the abdomen in both sexes, linear in the male, wider and a little flaring in the female. Rostrum attaining the fourth abdominal segment. Antennæ long and slender, formed as in *roseus;* basal joint nearly linear, as long as the head and pronotum together; second about one third longer than the first; third and fourth together about equal to the second. Apex of the genital segment of the male acutely triangular; dextral notch very shallow, sinistral deep and broadly and obtusely triangular.

Color pale straw-yellow tinged with green on the pronotum and with testaceous on the elytra. Head with two fuscous spots behind the eyes and a faint one on the loræ sometimes wanting, those behind the eye extended a little way on the sides of the pronotum; hind edge of the pronotum narrowly white, on the middle bounded before by a double black arc which may become continuous or broken into dots. Scutellum black on the basal middle and with a black mark on the disk either side, which may be wanting; costal edge of the corium alternated with fuscous and white, a blackish streak along the center of the clavus and two on the corium following the principal veins, those of the corium sometimes widened into a fuscous or black cloud covering the inner apical angle; apical margin of the corium and cuneus alternated with black and white and there is a black point at the tip of the corium; cuneus sometimes tinged with pink. Membrane fuscous becoming black on the apical half, basally more or less irrorate with white, the outer border marked with two conspicuous white spots beyond the point of the cuneus, nervures pale, sometimes pink; in some individuals the membrane is largely whitish hyaline. Antennæ blackish; first joint fuscous dotted with white; second with a narrow white annulus at base and a broader one on the middle which is sometimes obscure; third joint very

carinate margins broad and pale; anterior lobe impuctate; posterior narrow, punctured, paler with two oblique discal vittæ and the narrowly white at base. Femora irrorate with brown, the posterior darker toward the apex and marked with a pale annulus on the apical fourth, tibiæ trianulate with fuscous, their apex and the tarsi black, the markings on the hind tibiæ obscure. Abdomen a little embrowned in the female or at times greenish.

Described from numerous examples taken on a ragged looking weed growing at Alpine and elsewhere among the hills, July. The colors of this insect harmonize very well with the flower and fruit clusters over which it roams, making it difficult of detection. When taken in the net it is very active and difficult to capture.

127. *Phytocoris roseus* Uhler. This graceful pretty species is occasionally taken on Eriogonum in June and July.

128. *Phytocoris canescens* Reut. Abundant everywhere on sage-brush in both the long and short winged forms through the entire year. The brachypterous form has a black cuneate mark on the elytra.

129. *Creontiades rubrinerve* Stal. San Diego, July; on Ambrosia.

130. *Creontiades femoralis* n. sp.

Larger and stouter than *rubrinerve,* more or less marked with rufous; Femora mostly fuscous or almost black. Length 7 mm.

Head convex above, the surface distinctly striate and the median sulcus conspicuous, yellowish-testaceous, irrorate with rufous. Basal joint of the antennæ shorter and much stouter than in *rubrinerve,* subfusiform, irrorate with sanguineous and armed with a few black bristles; second and third subequal in length and linear, each about twice the length of the first, obscure rufous; fourth paler, slender, nearly as long as the first. Rostrum reaching to the hind coxæ, pale, black at tip. Pronotum broader at apex than in *rubrinerve;* pallid with an obscure fuscous cloud along the hind margin before the scutellum and there may be a few fuscous dots scattered about the anterior and lateral surfaces. Scutellum pale, the extreme tip black, the base with a fuscous cloud bisected by a pale median vitta, about the disk are a few fuscous points. Elytra pallid, quite regularly dotted with minute fuscous points and marked with sanguineous along the costa and on the margins of the cuneus. Membrane pallid, the nervures concolorous. Beneath more or less marked with rufous; the femora and tibiæ in part minutely dotted with sanguineous, the posterior femora deepened to piceous black beyond the middle.

Described from two females taken at Pine Hills in October. The more convex vertex, thicker basal joint of the antennæ, pale testaceous color, the fuscous cloud on the base of the pronotum and scutellum and the piceous hind femora will distinguish this species. It has the broader form of *Eustictus* but wants the polished punctured surface of that genus.

131. *Poecilocapsus nigriger* Stal. Taken in numbers on the white sage at Mussey's in April; occasional elsewhere.

132. *Lygus pratensis* Linn. One form of this species very like the typical *lineolatus* P. B. is found abundantly about cultivated fields, especially alfalfa, throughout the year.

133. *Lygus pratensis* var. *elisus* n. var.

This is a smaller form often taken in great numbers on Chenopodium. It is pale greenish with the pronotum and scutellum of a clearer green; head and anterior margin of the pronotum yellowish, neck when depressed showing a black line. Pronotum with two round black dots placed just behind the callosities and sometimes a few brown points before them. Scutellum usually showing two mediam basal dashes and the extreme lateral angles black. Elytra pallid with a dusky cloud on the middle of the clavus and a double one on the disk of the corium posteriorly, all of which may be reduced or wanting; there is a minute brown point at the tip of the clavus and another at the apex of the cuneus. Legs paler than in the typical form but with the same pattern of marking. Length 5-6 mm.

Described from numerous specimens taken at Mussey's August 6th, 1913, and elsewhere.

134. *Lygus contaminatus* Fallen. Not uncommon, May to October. This is quite distinct from the eastern *pabulinus;* it varies some in the amount of the dark clouding on the elytra.

135. *Lygus sallei* Stal. Occasional, April to June. The brilliant sub-metallic polish of this species with the slender black and white lines on the hind margin of the pronotum will distinguish it.

136. *Lygus rubicundus* Fallen. Two uniformly rufous examples were taken at Mussey's in May, 1914.

137. *Lygus distinguendus* Reut. I have a single specimen from the Selkirk Mts., B. C., that seems to be variety B of Reuter (Hemip. Gymn. Eur. V, p. 74, 1896). The variety described below is apparently constant and may prove to be a distinct species.

138. *Lygus distinguendus* var. *nubilus* n. var.

Form of *rubicundus* Fall.; yellowish-testaceous mottled and clouded with fuscous or black. Head with a dot on the cheeks before the base of the antennæ and unusally about four spots on the vertex forming a square. Antennæ pale, the third and fourth joints and usually the apex of the second infuscated. Pronotum in fully colored examples with fuscous markings as follows: a spot on the anterior margin behind the eye, another behind each callosity which may be enlarged and form a cloud on the anterior disk, a point near the middle of each lateral margin, and four on the hind edge which may unite and form a transverse vitta. In pale examples most of these markings are reduced or absent but the two spots behind the callosities and those on the humeri persist. Scutellum black with the basal angles and median line pale, the extreme tip white. Brown markings on the elytra usually forming

two transverse bands, one at apex and the other beyond the tip of the scutellum; the inner margin of the clavus is often brown and the pale areas are dotted with brown; the whole surface varied with groups of white hairs. Cuneus pale with the inner angle fuscous and the extreme tip castaneous-brown. Membrane blackish with the base, a marginal spot at the apex of the cuneus and a fainter one on the disk whitish. Beneath the sternum and meso- and meta-pleura are marked with black and there are about three black dots on the propleura. Legs pale, normally with two or three fuscous bands. Length 4 mm.

Described from numerous examples taken on elderberry trees growing along the streams and gullies throughout the county. This tree or shrub has a powerful and exceedingly disagreeable and suffocating odor which is not alluded to in any botanical work on this region to which I have access.

139. *Camptobrochis fulvescens* Reut. Alpine, two examples taken in June. This seems to be our only representative of the subgenus *Euarmosus* in which the body is more flattened above and the embolium is continued distinct as far as the cuneus.

140. *Camptobrochis schwarzi* Uhler. This species is abundant on the chaparral from May to July and is subject to great variation in color. Some are nearly as pale as *fulvescens* while others are almost entirely black above, with the head, collum and cuneus only rufous; beneath the body and legs are mostly rufous; antennæ pale rufous with the thickened apex of the second joint black. In this species the sides of the pronotum are straight or almost sinuated, nearly to the apex and are punctured close to the edge without the smooth carina found in *cerachates* and *fulgidus;* from the latter it also differs by the colored antennæ and legs, black scutellum and rufous cuneus.

141. *Camptobrochis fulgidus* n. sp.

Deep shining black; head rufo-testaceous, scutellum sanguineous. Length 5 mm.

Form of *schwarzi;* broad oval, convex. Head as in the allied species, polished, rufo-testaceous; tip of the clypeus and a line below the antennæ dusky. Antennæ entirely black. Rostrum blackish. Pronotum unusually convex and with the elytra polished and coarsely punctured; callosities prominent, polished, confluent; sides distinctly regularly arcuated, the extreme edge carinate and impunctate. Scutellum polished, impunctate, sanguineous or sometimes dusky on the extreme base, strongly convex as in *schwarzi.* Membrane black, minutely corrugated but smooth in the areoles. Beneath the legs black.

Described from numerous examples taken about San Diego and as far east as Alpine, March to June. I also have one specimen taken by Mr. Fordyce Grinnell at Pasadena and I took another at Fort Collins, Colo., in July, 1900. This species has much the color of *sayi* but pertains to a different section of the genus distin-

guished by the more convex form and by having the embolium merged with the corium beyond the middle, the present species lives on Ceonothus.

142. *Camptobrochis validus* Reut. Torrey Pines, from elder trees growing near the foot of the grade, June 21, 1914. This species is exceedingly variable in color and I possess specimens that are almost entirely black. Those from Torrey Pines have the antennæ entirely black and the head mostly so; the scutellum margined with pale.

143. *Camptobrochis phorodendronae* n. sp.

Nearest *schwarzi* but very distinct from any described species; small, broad ovate, very convex; elytra impunctate, bullate, abruptly deflexed behind. Length 3 mm.

Head almost vertical, transverse; vertex convex, polished as in the allied species; clypeus and cheeks together abruptly produced from the transverse front line of the face, basal sulcus of the vertex if present obscured by the markings, certainly absent at the middle. Antennæ proportionately shorter than in *schwarzi;* basal joint very short, hardly attaining the apex of the clypeus; second about as long as the pronotum, moderately clavate; third and fourth shorter, together about two thirds the length of the second; the fourth much shorter than the third. Eyes very large and prominent. Rostrum attaining the intermediate coxæ, the first joint scarcely surpassing the anterior line of the eyes. Pronotum short, strongly convex and rounded, polished, coarsely punctured, callosities prominent, not attaining the lateral margins, resting on the very pronounced collum; sides moderately arcuated; hind margin strongly rounded; middle line smooth as are also the narrow lateral and posterior margins. Scutellum strongly convex, impunctate, polished as in *schwarzi.* Elytra broad, a little bullate posteriorly, highly polished, impunctate except for a single line on the claval suture; embolium narrow, scarcely widened at base or connivent with the corium beyond the middle; cuneus small, polished and with the membrane almost vertical, the latter with one strong nervure only. Legs normal, smooth.

Color pale testaceous becoming almost white on the scutellum across the bullate disk of the elytra and on the legs. Vertex circumscribed by brown and with a transverse line posteriorly, margins outside the annulus and the clypeus yellowish-white, the clypeus edged with black. Apex of the second antennal joint broadly black; two thirds of the third and all but the narrow base of the fourth brown. Rostrum pale, the basal joint and adjoining surface darker. Pronotum with a lateral line, two oblique marks on the disk and two large spots on the base blackish; collum yellowish-white, lined behind with black. Scutellum with the tip and three more or less obvious basal clouds infuscated. Elytra pale brownish, the bullate posterior disk transversely whitish; all the margins of the clavus and the costal and subcostal nervures black; cuneus castaneous-brown. Membrane brownish hyaline, darker across the disk, the nervure lined with black. Beneath black; the

propleura and most of the venter pale, the basal disk of the latter and the genital segment largely black. Femora with a dusky subapical annulus.

Described from four female examples taken on the oak mistletoe, Phorodendron villosum, growing on oaks at Pine Hill in October, 1913. The bullate impunctate elytra and transverse head would almost seem to warrant the erection of a new genus for this species but it is no more distinct from *Camptobrochis* than are some of the other genera Dr. Reuter has sunk as synonyms and it seems best for the present to place it as a section of that genus. I have been unable to make out the aroliæ. The depth of coloring is undoubtedly subject to variation.

144. *Peociloscytus uhleri* n. n. (P. *intermedius* Uhler, Proc. Calif. Acad. Sci., Ser. IV, p. 261, 1891; not of Jakowl., 1876.) The species I am identifying as *intermedius* Uhler is very abundant through the spring. It differs from Uhler's description in many points, but I cannot believe it distinct. It is larger and more fulvous in color than *basalis* with the basal joint of the antennæ pale, the femora darker toward their apex but not distinctly annulated, the vertex is more convex and wants the striæ and the male genital characters are appreciably different. It is extremely variable in color as is *basalis*, some individuals being largely black above.

[A recent comparison with the Uhler type now in the collection of the California Academy of Science shows this determination to be correct.]

145. *Poeciloscytus elegans* Reut. I have taken this pretty little Capsid on a species of Galium which grows on the dry, rocky hillsides in the back country, May and June.

Genus Pycnocoris n. gen.

Evidently allied to *Poeciloscytus* but with somewhat the aspect of a heavy *Neurocolpus*. Distinguished by the rough opake surface of the body, the short, greatly thickened first two antennal joints, the short and abruptly slender apical joints and the tumid scutellum. Whole surface clothed with short whitish scale-like hairs intermixed above with short black bristles.

Form stout, broadly ovate-oblong. Head nearly vertical but less so than in *Neurocolpus* and broader when viewed from above. Base of the vertex without a carina; clypeus arcuated and prominent. Antennæ short and thick; first joint as long as the width of the vertex and one eye, stout and cylindrical nearly to its base; second twice the length of the first, clavate, the apical two fifths nearly as thick as the first joint; third and fourth abruptly slender, together not as long as the first, fourth two thirds the length of the third. Pronotum transverse, sloping strongly to the head, sides nearly straight, collum slender, callosities poorly defined, hind margin nearly rectilinear across the scutellum. Disk of the scutellum strongly tumid. Elytra broad, almost parallel, the costa slightly expanded near the base, surface rough but scarcely punctate. Membrane a little surpassing the tip of the abdomen. Ros-

trum attaining the apex of the intermediate coxæ, the basal joint clavate, reaching over to the base of the anterior coxæ. Basal joint of the hind tarsi a little longer than the second; arolia free, divergent.

Type *Pycnocoris ursinus* n. sp.

146. *Pycnocoris ursinus* n. sp.

Color testaceous brown, becoming testaceous on the cuneus, abdomen and legs, the corium crossed by two broad fuscous bands, one just beyond the scutellum and the other at the apex, the former often obsolete. Head tinged with rufous in the region of the tylus, Antennæ closely clothed with short stiff hairs which become whitish on the apical two joints; dark rufous brown becoming clear rufous on the basal two thirds of the second joint, the basal one half of the third joint whitish. Rostrum pale reddish becoming black at apex. Pronotum very uniform in color, a little darker toward the base and castaneous anteriorly. Scutellum darker on the tumid portion. Elytra with the costal area pale testaceous, the whitish hairs becoming golden on the dark areas as they are on the dark tumid portion of the scutellum. Cuneus rufous or sometimes yellowish on the disk, the tip darker or sanguineous, the basal angle infuscated. Membrane infuscated, marked with a large whitish spot at the tip of the cuneus which may be extended to an incomplete transverse vitta, nervures dark sanguineous. Beneath more or less sanguineous becoming yellowish on and near the coxæ and at times on the venter. Meso- and Meta-pleura blackish. Legs rufo-testaceous, especially on the femora which are dotted with sanguineous, tips of the tarsi infuscated. Length 6-7 mm.

Described from eight female examples taken from the chaparral at La Jolla, San Diego and Alpine during March and April. When immature the insect is more greyish with the cuneus pale. This large heavily built insect is very different from anything known to me nor can I find any genus that will receive it. At first look it would almost certainly be placed near *Neurocolpus* but its true affinities seem to be with *Poeciloscytus*.

147. *Irbisia pacifica* Uhler. Not uncommon in damp situations on tall grass. May.

148. *Irbisia brachycerus* Uhler. This is perhaps the most abundant Capsid in cultivated districts in southern California. I found it common in Colorado and also have specimens from Utah and New Mexico. The legs are ordinarily rufo-fulvous but in some I cannot otherwise distinguish they are black. The legs are wanting in Dr. Uhler's type so we cannot tell which form is the typical one but it seems to me we might be justified in assuming that it was the more common red-legged form that he had before him. If we do this we can place Heidemann's *Capsus solani*, which does not seem to differ specifically, as the black legged form and as variety *solani* it would be equivalent to var. *tyrannus* Fabr. of *Capsus ater Linn.*

149. *Platytylellus basivittis* Stal. Occasional, April to July. I have taken some color varieties which probably are not distinct from this species.

150. *Stenodema gracilis* n. sp.

Aspect of *vicina* but more slender with the antennæ black or nearly so. Length 7-8 mm.

Head a little more produced before the antennæ than in *vicina*, the median sulcus distinct; Antennæ longer, first joint thinner and distinctly longer than in that species, as long as the pronotum. Rostrum attaining the hind coxæ, the first joint just reaching the base of the head. Pronotum narrower and more convex than in the allied species, coarsely punctured, the median smooth line nearly obsolete; sides sharply carinate, narrowly foliaceous. Basal lobe of the scutellum a little exposed, disk of posterior lobe obscurely transversely punctate or rugose. Elytra slender, parallel, punctured except on the broad costal area and cuneus. Legs shorter and more slender than in *vicina*.

Color: Female, yellowish-testaceous. Antennæ dark castaneous or piceous black; a broad black vitta covers the sides of the head including the base of the antennæ and the eyes, crosses the pronotum and covers the basal angles of the scutellum. Elytra dusky brownish with the smooth costal margin and cuneus pale. Beneath and legs palè with indications of a longitudinal vitta across the pleural pieces and sides of the abdomen; tip of the rostrum and tarsi black; femora not dotted. The basal joint of the antennæ is paler beneath and the middle line of the rostrum is dark.

In the male the black vittæ above and below are much extended, covering most of the surface; above omitting a nearly parallel yellowish median vitta to the apex of the scutellum, and the expanded sides of the pronotum and elytra; the disk of the elytra is dark brown, more blackish on the scutellum. Antennæ black; rostrum as in the female; the femora a little darker.

Described from numerous specimens of both sexes taken at San Diego, Lakeside and Mussey's during April and May. From Carberry in Canada I have received a pale example of what is probably this same species, showing a wide range to the north. Although the base of the scutellum is narrowly exposed the base of the pronotum is truncate and the species evidently belongs to *Stenodema*.

151. *Trigonotylus breviceps* Jakw. This species which I believe I have rightly identified is common on a low fine grass growing in moist locations at most places where I have collected in this county. It is found throughout the year.

152. *Dicyphus californicus* Stal. April and May. Common.

153. *Dicyphus vestitus* Uhler. Occasional in the back country from April to June. I have taken few individuals of this species that are as dark as indicated by Dr. Uhler.

154. *Dicyphus minutus* Uhler. April, a few only.

155. *Paraproba pendula* n. sp.

Allied to *fasciata* Dist. but evidently distinct. Whitish; head

and antennæ mostly, pronotum laterally, and the scutellum black; closed elytra with a pendulum-like fuscous mark touching the base of the membrane. Length to tip of the elytra 3 mm.

Head viewed from above transversely oval; vertex convex, almost vertical before; clypeus triangularly produced; surface polished, impunctate, behind the eyes abruptly narrowed, leaving the eyes distinct from the pronotum. First joint of the antennæ nearly as long as the width of the head across the eyes; second linear, two and a half times the length of the first and a little more slender; third and fourth together a little longer than the second, much thinner. Rostrum attaining the intermediate coxæ. Pronotum trapezoidal, its sides straight, the base nearly so; collum wanting; callosities distinct; surface smooth, impunctate. Basal lobe of the scutellum well exposed. Elytra long and parallel, subhyaline. Legs long and slender; tibiæ smooth. Basal joint of tarsi apparently shorter than the second. Areole of the wing without a hamus. I am unable to detect the arolia.

Color pale yellowish-white, often strongly tinged with bluish-green on the elytra. Head black, the base behind the eyes ochraceous and the gula fuscous. Antennæ black, the base of the first joint pale. Disk of the pronotum broadly pale or ochraceous, the sides usually broadly, sometimes narrowly, black. Scutellum black; its basal lobe, or at least at either side, fulvous. Elytra whitish subhyaline, more or less tinged with bluish-green; narrow scutellar and commissural margins of the clavus blackish, connecting with a transverse oval fuscous spot on the inner angle of the corium. Membrane hyaline, iridescent, with a very faint smoky discal cloud, the nervures brownish. Beneath pale, or with the pleural pieces and margins and the apex of the abdomen black. Legs pale, the femora, knees and tibiæ sometimes a little darker above. Rostrum pale.

Described from numerous examples taken at Leona Heights and Palo Alto, Calif., in August, by Dr. J. C. Bradley and two paler examples taken by me at San Juan Capistrano, June 25th, 1914. I have not yet detected this species in San Diego County but it doubtless will be taken along our river valleys. In this description I have included many generic characters as the genus seems not to have been known to Dr. Reuter. The present species is close to *fasciata* Dist., but undoubtedly distinct. *Paraproba* differs from *Dicyphus* chiefly in the form of the pronotum and may have to be merged with it after a more careful study.

156. *Coquillettia insignis* Uhler. San Diego, taken on chaparral in June.

157. *Closterocoris amoenus* Prov. This pretty insect is one of our most abundant Capsids. It occurs throughout the year on various plants and bushes and is subject to some variation in the depth of its coloring.

158. *Cyphopelta modesta* Van D. One example of this pretty insect was taken by Mr. W. S. Wright at San Diego, May 21st 1913. The unique type was taken by Mr. Fordyce Grinnell at Pasadena in June.

159. *Pilophorus* sp. Found in abundance on willows at San Juan Capistrano in June but not yet taken in San Diego County, although it undoubtedly occurs here.

160. *Pilophorus* sp. One example taken in a ravine at Alpine in October, 1913. As Dr. Poppius has recently published a paper on genus *Pilophorus* which I have not seen it seems better not to attempt to describe new species in this genus at present.

161. *Pamillia behrensii* Uhler. Taken on the mistletoe of oaks at Pine Hill in October, 1913. I also took a few among ants under bark of the sycamore at Alpine in January, 1914. There were mistletoe plants on this tree and it is more than likely that these insects had lived on those plants and were hybernating when taken. My specimens are lighter and more clearly marked than those described by Dr. Uhler but the difference in latitude might account for this.

162. *Diaphnidia provancheri* Burq. Grossmont and Alpine; taken from willows in May and June, and also taken from willows at San Juan Capistrano in June, 1914. These differ in no way from the species as found in New York, Ontario and Quebec.

163. *Diaphnidia hamata* Van D. A few taken at Alpine in June and others from the Cuyamacas at an altitude of 5,000 feet in October.

164. *Orthotylus chlorionis* Say. April to June, occasional about cultivated fields.

165. *Orthotylus coagulatus* Uhler. Alpine, April, 1913.

166. *Orthotylus viridicatus* Uhler. Not uncommon from March to May. Perfectly fresh specimens are irregularly clothed above with deciduous black hairs.

167. *Orthotylus inconspicuus* Uhler. I have taken several specimens of what I believe to be this species at Foster's in May and Alpine in June.

168. *Ceratocapsus elongatus* Uhler. Two large strongly colored examples of this species were taken at Alpine in June. These agree in every essential particular with a long series I took in Colorado in 1900, examples of which I submitted to Dr. Uhler with the request that he compare them with his *elongatus*. He wrote me that they were this species and returned my specimens so labelled so I am holding them under that name although they differ in some respects from his description. Normally the elytra are pale with a broad somewhat V shaped fuscous vitta across the apex of the elytra, its apex covering the base of the membrane. In this species the fuscous apical portion of the membrane is well distinguished and nearly straight.

169. *Ceratocapsus setosus* Reut. One specimen that seems to differ in no respect from Florida specimens in my collection except that it is a little darker, was taken by me in the city park, San Diego, in May, 1913.

170. *Lopidea marginata* Uhler. Abundant on the chaparral throughout the summer. An examination of the Uhler type now in the collection of the California Academy of Science shows that my former determination of this species as the pale-margined form of *media* was erroneous. This species is common over a great part of California and it is the form which has been distributed under the MS name of *Lopidea obscura* Uhler. Generally the clavus as well as the costa is pale.

171. *Lopidea nigridea* Uhler. This large blackish species is abundant everywhere on the chaparral during May and June.

172. *Hadronema robusta* Uhler. Abundant on the "white sage" during May and June, especially on the dry granite hillsides in the back country.

173. *Strongylocoris stygica* Say. Common on sun-flowers growing along the banks of small mountain streams at Mussey's, Alpine and elsewhere from April to June. I have been unable to detect the black legged *atrata* reported as common about Los Angeles by Dr. Uhler.

174. *Strongylocoris croceipes* Uhler. Alpine, May and June, two examples.

175. *Macrotylus tristis* Uhler. Lakeside, Foster and Mussey's, April and May; not common. This species has a strong superficial resemblance to *luniger* as figured by Dr. Reuter but it seems to be sufficiently distinct. There is generally a pale spot on each of the callosities.

176. *Macrotylus regalis* Uhler. My three specimens are much smaller than indicated by Dr. Uhler and differ in some other particulars, and I feel some doubt about the identification but they are all males while Uhler's type specimen was a female and this with the difference in locality may account for the discrepancies. In my males the vertex has a red vitta reaching the base of the tylus, the entire pronotum is red with three more or less distinct dusky vittæ, the median invading the base of the scutellum, the costal margin is black, widening a little to the cuneus; the membrane is smoky with the veins pale; legs testaceous-brown with the femora tipped with pale and the extreme base of the tibiæ and the tarsi blackish; the rostrum is pale, the first joint beneath and the apex blackish; and the sides of the pleural pieces are red. These characters seem almost specific but it does not seem best at present to so consider them. All my specimens were beaten from chaparral in June.

177. *Maerotylus angularis* Uhler. Three examples taken at San Diego on the white sage in April and May, 1913.

178. *Macrotylus vestitus* Uhler. Lakeside and Alpine, May and June.

179. *Oncotylus repertus* Uhler. Mussey's, one example taken in April, 1914, from weeds growing along a stream.

180. *Oncotylus punctipes* Reut. La Jolla and Alpine. Taken on wild honeysuckle. These are a little larger than my eastern specimens but do not seem to differ otherwise.

181. *Lopus decolor* Fallen. Alpine, May; one example.

182. *Psallus anchorifer* Fieb. San Diego and Alpine, April to June.

183. *? Psallus breviceps* Reut. If I have rightly identified this species with material taken here it is perhaps our most abundant and widely distributed Capsid in this part of the state. The males are rather slender and mostly dark, with the legs somewhat paler and a broad white arc on the base of the cuneus. The female is more ovate with the elytra paler at base as noted by Reuter and this coloring is sometimes found in immature males. The antennæ are mostly blackish in both sexes. Dr. Reuter evidently had two pale females before him when describing the species.

184. *Criocoris saliens* Reut. I have found this species abundant on a species of Galium growing on the dry hillsides at Mussey's, Alpine, etc., from April to June. It most certainly belongs to genus *Criocoris*. The form and color of the second antennal joint of the female on which Dr. Reuter founded his genus *Strongylotes* is entirely inappreciable. This species is very close to my *canadensis* but it is little narrower, the second joint of the male antennæ is broader and more flattened and narrowed toward the apex, the extreme base of this joint in the female is concolorous and not black as in my eastern species and the membrane wants the pale markings found there.

185. *Plagiognathus verticalis* Uhler. I took this species in great numbers at Ocean Beach in May, 1913, and have found it common elsewhere during April and May. Uhler's description is very inadequate but I believe I have rightly determined the species. Dr. Reuter's keys for separating this genus from *Psallus* are unsatisfactory. Comparing specimens determined by Dr. Reuter himself I find the eyes are not more granulated nor the last tarsal joint longer in *Psallus*.

186. *Plagiognathus decolor* Uhler. San Diego and Lakeside; April and May. I am much inclined to think that this species would better be left in *Agalliastes (Chlamydatus)* where Dr. Uhler placed it.

187. *Atomoscelis seriatus* Reut. This pretty little species seems to be abundant at many places from San Diego to Alpine from April to September.

188. *Tuponia modesta* n. sp.

Pale green, the elytra nearly white, clouded with greenish; legs white dotted with black; above clothed with white hairs. Length to tip of membrane 2 mm.

Head broad, about two thirds the width of the hind margin of the pronotum, short, nearly vertical; vertex broad, moderately convex, opake; base of the clypeus reaching just above the line of the antennæ; cheeks broad, attaining the fore coxæ, the gula wanting; buccal opening broad. Rostrum reaching the intermediate coxæ. Antennæ long, the basal joint very short, scarcely surpassing the clypeus, second about as long as the pronotum and eye together, linear; third two thirds the length of the second; fourth two thirds the length of the third. Pronotum short and broad, its length about one half that of the hind margin, impunctate, a little polished posteriorly; the callosities distinct, contiguous; collum wanting. Scutellum large, the base broadly exposed. Elytra flat, subhyaline, the costal margin but little arcuated. Hind femora hardly flattened. Last joint of the tarsi nearly as long as the basal two together; claws long, moderately curved, the short arolia on their base.

Color pale green tinged with yellowish on the head and callosities. Antennæ testaceous with a brown dot before. Extreme apex of the scutellum blackish. Elytra whitish, subhyaline, scarcely tinged with green, with about three faint and obscure transverse clouds, one just behind the scutellum, another across the apex of the clavus and the third represented by a cloud on the cuneus; a minute brown point on the tip of the clavus. Membrane whitish with a faint cloud at the tip of the cuneus and a larger one beyond, the nervures white, Legs whitish; femora with about two black points at apex, the posterior with a row of about five along its hind edge; tibiæ with about six black points alternating with black spines. Apex of the tarsi blackish. Beneath a uniform pale green, the tip of the rostrum black.

Described from 13 examples taken in the city park on December 25th, 1912, and during January and April, 1913. This species while it has the broad head of *Chlamydatus* is undoubtedly a *Tuponia*. Its delicate greenish mottled color and dotted legs will distinguish it.

189. *Rhinacloa forticornis* Reut. One example taken at East San Diego in June.

190. *Chlamydatus associatus* Uhler. Hurlburd's Ranch at Descanso, October.

191. *Chlamydatus suavis* Reut. April to June. Abundant.

192. *Chlamydatus bicinctus* n. sp.

Black or piceous-black, polished; antennæ and legs pale; elytra with a transverse white vitta at apex of the scutellum and the base of the cuneus broadly white. Length 2½ mm.

Head rather broad, nearly vertical, moderately produced at apex; vertex wide, convex, highly polished, immarginate; clypeus prominent, its base distinctly above the line of the antennæ; eyes

oval, scarcely sinuated before. Rostrum attaining the apex of the hind coxæ. Antennæ short; basal joint just passing the apex of the head; second as long as the pronotum and eye together when viewed from above; third and fourth together as long as the second in the female, a little shorter in the male. Pronotum short, more narrowed anteriorly in the male, the sides straight; callosities narrow in the female, nearly obsolete in the male, surface polished. Base of the scutellum narrowly exposed. Elytra nearly parallel, flat; cuneus long and acute at apex, nearly horizontal.

Color piceous or black, the elytra usually a little paler. Antennæ testaceous-yellow, dusky at apex. Elytra with a broad white band across just beyond the tip of the scutellum which may be much reduced in the male; base of the cuneus broadly white; membrane uniformly smoky, iridescent, its nervures black. Legs pale yellow or fulvous, the posterior femora fuscous or piceous; tibiæ immaculate, the spines concolorous, the tarsal claws black. Rostrum pale with the tip black.

Described from numerous specimens taken on Ceanothus in the spring, March to June. This species is very distinct by its polished black color with two conspicuous transverse white bands.

193. *Leucopoecila albofasciata* Reut. Common in alfalfa fields throughout the year.

194. *Maurodactylus semiustus* n. sp.

Soiled greenish white more or less tinged with fulvous; membrane uniformly smoky; above clothed with short dark deciduous hairs. Length to tip of membrane scant 3 mm.

Head short, vertical, about two thirds the width of the hind margin of the pronotum, strongly tinged with fulvous; vertex broad, convex, polished; basal suture of the clypeus not distinct, a little above the base of the antennæ. Rostrum almost attaining the apex of the hind coxæ. Antennæ rather long, more or less infuscated; basal joint just passing the tip of the head, thickened at apex; second nearly as long as the basal margin of the pronotum; third and fourth together twice the length of the second, the third twice as long as the fourth. Pronotum short, transverse, the sides arcuated; callosities moderately prominent; surface polished, quite strongly tinged with green on the disk of the callosities, the margins more yellowish. Basal lobe of the scutellum narrowly exposed. Elytra concolorous, polished, with the black hairs more persistent. Membrane uniformly smoky but paler in the areoles, the nervures pale. Beneath are legs concolorous, the basal margin of the venter more greenish or this color may cover the pleural pieces. Tibial spines and apex of the tarsi black.

Described from a good series swept from a low weed found growing on top of the rocky hills at Mussey's, April 11th, 1914. This insect has much the aspect of a *Tuponia* and perhaps should be placed in that genus but in Reuter's key to the genera of this tribe it runs directly to *Maurodactylus*. The uniformly smoky membrane and greenish yellow color, below as well as above, will distinguish this tiny species.

Family VELIIDAE

195. *Microvelia americana* Uhler. Mussey's, August, 1913. Taken from a small canyon pool among the hills.

196. *Rhagovelia obesa* Uhler. Hurlburd's Ranch, near Descanso, October.

Family GERRIDAE

197. *Hygrotrechus orba* Stal. Common everywhere on ponds and streams, March to October. I do not feel satisfied that I can distinguish this from *remigis* Say.

Family SALDIDAE

198. *Pentacora signoreti* Guer. March to May. Common on salt marshes along the coast and on the damp sands of San Diego river as far up as Lakeside. Young in March.

199. *Saldula interstitialis* Say. Abundant everywhere in suitable places throughout the year. I have proposed *Saldula* to replace *Acanthia* of Reuter (not of Fabricius) with *saltatoria* Linn. as type.

200. *Micranthia pusilla* n. sp.

Size and much the aspect of *humilis* Say, but with broader elytra. Elytra deep black with two white costal spots and the membrane strongly distinguished. Length 3 mm.

Head as in *humilis*, black, with a transverse white line at the base of the tylus. Antennæ black, the joints subequal; the first a little shorter, the second longer than the third and fourth. Rostrum black. Pronotum broader posteriorly than in *humilis*, sides nearly straight, the humeral angles a little more rounded; hind margin broadly but shallowly excavated. Scutellum as long as broad, with a shallow transverse impression, and with the pronotum opake, black and closely minutely sericeus pubescent. Elytra with a somewhat longer pubescence; deep black becoming velvety black toward the apex of the corium and on the tip of the clavus; corium with a square whitish spot resting on the costa and a double one close to the apex; usually there is a small white point on the middle of the corium, one at the inner apical angle and another near the tip of the clavus. Membrane strongly differentiated, whitish hyaline, a little enfumed, the nervures strong, brown; the areoles with a brown subapical mark and sometimes another near the base. Beneath and legs black, the knees, tibiæ except at base and apex and the tarsi, their tips excepted, pallid. In the female the apex of the abdomen and sometimes the slender hind margins of the ventral segments are pale.

Described from three males and two females taken along the San Diego River at Lakeside, May 7th, 1913, and from a moist ravine at Alpine in June. Dr. J. C. Bradley also took this species at Sisson, Calif., in August, 1908. The species can be easily recognized by its small size, intensely black color, the strongly distinguished membrane and the four white marginal spots on the elytra.

201. *Ioscytus politus* Uhler. I took one example of the typical form of this species as described by Dr. Uhler by a pond in Rose Canyon near La Jolla, in September, 1913. In july,

1903, I found this species not uncommon about a pond at Elitch's Gardens at Denver, Colo., but these were a little larger with the elytra a clear reddish, the clavus only black.

Family NEPIDAE

202. *Ranatra brevicollis* Montd. One female I believe belongs here was captured in a pond near Barona Ranch at Mussey's in August. It was not fully developed and some of its characters were obscure. A very dark male taken by Mr. F. W. Kelsey in Pine Valley in the Cuyamaca Mts. in April may belong here.

Family BELOSTOMIDAE

203. *Abedus (Deinostoma) dilitatus* Say. What I believe to be the young of this species is common in most pools, especially back among the hills, but I have been unable to obtain an adult.

Family GELASTOCORIDAE

204. *Gelastocoris variegatus* Guer.? A very clearly marked form which I have provisionally determined as this is common along the San Diego River as far up as Lakeside. The silvery points on the elytra are very conspicuous in this species. May to July.

Family NOTONECTIDAE

205. *Notonecta mexicana* H. S. Mussey's, August, taken from a shaded pool. If I am correct in my determination of this species it is near *undulata* Say but is proportionately shorter.

206. *Notonecta insulata* Kirby. One example of this species occurred at Mussey's with the preceding but I found it in numbers in a stream at Pine Valley in October, 1913.

207. *Buenoa platycnemis* Fieb. Found in abundance in a pool in Rose Canyon near La Jolla in September.

HOMOPTERA

Family FULGORIDAE

208. *Amycle saxatilis* n. sp.

Allied to *amabilis*, broader and proportionately shorter than in *vernalis;* fuscous, irrorate with pale; tergum and base of the wings red or luteous. Length to tip of abdomen 11 mm., to tip of elytra 13 mm., alar expanse, 21 mm.

Head thin and strongly produced. Vertex a little longer than the pro- and meso-notum together, ligulate, narrowing to the middle then a little expanded and again narrowing to the broad subangular apex. Surface depressed with a linear medium groove and a discal carina either side which diverge at base, before the middle and again at apex, the submargins laminate-carinate. Front nearly flat; apex expanded to before the eyes, feebly sinuated at the an-

tennæ; the disk with fine longitudinal striæ, the carinæ nearly obsolete; clypeus more prominent, feebly convex, compressed and distinctly carinate toward the apex. Pronotum transverse, one half the length of the mesonotum, feebly angularly excavated behind and slightly sinuated, truncate before; disk with three prominent obtuse parallel carinæ and an impressed point on either side, the lateral carinæ placed just inside the outer angles of the vertex; post-ocular protuberance acute but shorter than in *vernalis*. Mesonotum feebly tricarinate, the lateral prominent near their base. Elytra parallel, a little sinuated at their middle, the areolar reticulations obscure basally. Hind tibiæ trispinose; abdomen strongly depressed, with two discal carinæ indicated, but irregular and broken.

Color fuscous brown inclined to greyish, minutely irrorated with pale, varied with darker on the middle field and apex of the vertex, cheeks, sides of the pronotum and on the chest including the apex of the clypeus and the coxæ; front and base of the clypeus paler. Elytra more greyish, minutely varied with fuscous especially toward their apex; the outer claval nervure interrupted by a whitish median spot. Wings smoky hyaline; luteus, or in fully colored examples red, on the basal half; the transverse veinlets and alternate longitudinal nervures heavy and fuscous in the smoky apical part. Tergum and sides of the metanotum fulvous or red, the narrow base and lateral margins and the genital segment fuscous.

Described from three males; two taken on the rocky hillsides at Grossmont and Lakeside in May, 1913, and one beaten from a pine tree at Torrey Pines on July 4th, 1914. I have repeated some generic characters here as no full description of the genus or any species has yet been published.

209. *Orgerius rhyparus* Stal. Taken occasionally from La Mesa to 4,000 feet in the Cuyamacas. Young from February to June, adults from June to October. It seems to prefer the canyons among the hills.

210. *Timodema miracula* Ball. Occurs with the last and well up in the Cuyamacas. Both of these species have the singular habit of standing in a nearly erect posture and when disturbed are powerful leapers. The black color with transverse white bands and flattened legs will distinguish this form.

211. *Orgamara acuta* Ball. I took a typical example of this odd looking insect on North Island, Coronado, June 30th, 1813, and a darker specimen at Lakeside in October. Young in May and June.

212. *Scolopsella reticulata* Ball. Mr. Frank Stephens has taken several examples of this species at La Puerta Valley on the eastern slopes of the Cuyamacas for which I am indebted to Mr. W. S. Wright. It is hardly likely that they occur on this side of the mountains.

213. *Scolops pallidus* Uhler. Abundant everywhere. In this species the disk of the metanotum is conspicuously pale, a character not mentioned by Dr. Uhler. There is a pale form of this species with immaculate nervures.

214. *Scolops piceus* n. sp.

Allied to *Belanocharis fumida* Uhler but certainly distinct. Black marked with whitish on the cephalic protuberance and beneath. Elytra subhyaline picous. Length to tip of cephalic horn 6-7½ mm.

Female: Cephalic horn long and slender, linear, white with a black line above and on either side; disk of the vertex convex, deep black and highly polished, its lateral carinæ marked with two white dots against each eye. Front slenderly tricarinate, regularly widened to the apex which is concavely arcuated; black dotted with pale, broadly white across the apex. Clypeus convex, polished, slenderly tricarinate, its base black with a few pale irrorations, apical portion pale. Pro- and meso-notum black, irrorate with pale. Pleuræ and abdomen black obscurely irrorate with pale. Legs pale the femora more or less varied with fuscous; anterior and intermediate tibiæ triannulated with white, spines of posterior tibiæ black. Elytra piceo-hyaline with a blackish cloud along the basal half of the costa and there may be a cloud at the tip of the first and second apical areoles. The male is smaller and darker with fewer pale irrorations.

Described from one male and three female examples. Mission Valley, San Diego, April; Foster on the rocky hillsides, May; Alpine, July. I cannot make this insect agree with Uhler's description of *fumida* and I believe it distinct. I see no reason for separating these species from Scolops.

215. *Catonia irrorata* n. sp.

Closely related to *fusca* but with the short vertex found in the typical section of the genus; front with two broad white bands; elytra fuscous with pale irrorations and nervures. Length 5-6 mm.

Vertex as in *impunctata* but proportionately wider and shorter, larger in the male but scarcely as long as half the width between the eyes. Front broader than in *impunctata* and *fusca*, the sides very feebly arcuated apex no wider than the base, scarcely excavated for the reception of the clypeus. Pronotum as in *fusca*, narrower and more acutely angled than in *impunctata*.

Color black, carinæ of the vertex, and pronotum and a spot in each basal fova of the vertex pale. Front with a median transverse white band, base broadly and the apex more narrowly deep black, the basal band with two pale points on either side. Clypeus white, blackish at apex. Mesonotum piceous black with ten obscure fulvous spots, two in each lateral and three in each discal compartment. Elytra fuscous-brown with a blackish vitta before the middle and a more obscure and broken one behind and a third indicated by a large spot on the stigma; nervures pale lined with darker, the areoles with about two rows of pale points. Legs very

pale fuscous, the knees, apex of the tibiæ and the hind tarsi paler. Abdominal segments edged with pale.

Described from two examples; a male taken May 6th at Brooklyn Heights in San Diego and a female taken March 11th at Alpine; both from manzanita bushes.

216. *Catonia fusca* Van D. Not uncommon on manzanita (Arctostaphylos bicolor) in the canyons east of San Diego and at Alpine, May and June.

217. *Catonia rubella* Van D. Abundant with the preceding, May and June.

218. *Catonia costata* Van D. Not uncommon on the rocky hillsides at Lakeside, Foster and Alpine. April to June.

219. *Oliarus californicus* n. sp.

Allied to *aridus* but with more of the aspect of *placitus;* elytral maculation of the female forming a short oblique vitta a little beyond the stigma, pale spot on the sides of the front small. Length 7-8 mm.

Vertex distinctly narrower and longer than in *aridus,* more parallel than in *placitus.* Front wider at base than in *aridus,* much wider than in *placitus.* Costal areole of the elytra wider. Male pygofers less deeply excavated than in *aridus,* the sides cut away obliquely to the dorsal angle, this edge slightly arcuated. In *aridus* the sides of the notch are much more nearly parallel and the apex is strongly produced in an obtuse lobe ventrally, the edge retreating dorsally for about half its length; median plate of the female broader and shorter.

Color black tinged with castaneous on the clypeus, median carina of the front, and on those of the mesonotum; lateral carinæ of the front and of the vertex posteriorly whitish; carinæ and hind margin of the pronotum narrowly pale, sides of the front with a small pale spot next the clypeus. Margins of the pleural pieces and ventral segments more or less pale. Legs pale fuscuous, the knees, hind tibiæ and tarsi whitish. Elytra whitish hyaline nervures pale with black punctures armed with long black hairs; before the middle is an oblique row of four black spots placed on the forks of the nervures; the apical and subapical nervures and the stigma clouded with brown and there is an oblique fuscous vitta covering the second apical areole and continued forward nearly to the subapical transverse nervures. These markings may be much reduced or in the male quite absent.

Described from many specimens of both sexes taken at most all places where I have collected in San Diego County, from May to October. This species is so close to *aridus* it is difficult to find good characters to distinguish it but they are obviously distinct. The form of the male pygofers, the small size of the pale spot on the sides of the front will best distinguish the males while the female can be recognized by the small frontal spots and the maculations on the elytra. *Placitus* is a larger eastern form with narrower base to the front and a longitudinal fuscous vitta on the apical half of the elytra of the female; *quinque-maculatus* and *vicarius*

have transverse elytral maculations. In some examples of *californicus* the disk of the mesonotum is distinctly castaneous.

220. *Oliarus complectus* Ball. Abundant everywhere. There are two forms of this species. In the more typical the mesonotum is black with the carinæ at times ferruginous; in the other the mesonotun, or at least the median compartments, is castaneous or at times almost sanguineous. In some examples the elytra are milky hyaline but ordinarily they are hyaline or more or less infuscated. This species has also been found in the east.

221. *Oliarus fidus* n. sp.

A little larger than *complectus;* short and stout; black, elytral nervures heavy and punctate. Length 4-5 mm.

Vertex nearly quadrangular, scarcely longer than broad, but little surpassing the eyes; hind edge deeply emarginate; apical compartments broad, convex; sides rounded, not obviously subangled as in many of our species; clypeal suture indistinct; median carina distinctly forked at the apex of the head; mesonotal keels prominent, the four lateral regularly arcuated. Male pygofers with a shallow notch armed with a short blunt tooth, the sides regularly arcuated; styles slender, strongly curved from their base about an ovate opening, meeting above and then abruptly reflexed, curving backward and outward under the lateral projections of the dorsal plate, the latter narrow and distant, not contiguous as in many species.

Color black, the carinæ of the head and pronotum pale. Rostrum, trochanters, knees, tibiæ and tarsi testaceous; slender margins of the abdominal segments pale; genital segments pale brown. Elytra milky hyaline, nervures strongly dotted with fuscous and armed with black bristles making them conspicuous, the transverse veinlets infuscated. In fully colored females there is a row of three fuscous spots in the costal areole, an oblique row of three on the transverse veins of the clavus and middle of the corium, and some small faint clouds in the anteapical areoles. Stigma small and inconspicuous.

Described from numerous examples taken on the rocky hillside south of the railway station at Foster on May 24th, 1913.

222. *Cixius cultus* Ball. Found occasionally everywhere but more frequently near the coast; May and June.

Genus Platycixius n. gen.

Allied to *Cixius;* head but little narrower than the pronotum; eyes narrow, oblique, feebly emarginate beneath. Vertex large, depressed, with a median carina and the lateral and anterior margins carinately elevated, base feebly arcuated. Front large, scarcely longer than broad, ecarinate, base as broad as the apex, tumid, sides arcuated, laminate outwardly, frontal ocellus conspicuous; clypeus tumid, apparently ecarinate. Pronotum longer than in *Cixius*, tricarinate, the lateral carinæ running oblique and straight to the hind margin, behind the eye is a callous apparently connect-

bose. Hind tibiæ unarmed. Elytra subparallel, the costa arcuated at base; claval veins united beyond the middle; radial and ulnar nervures united by a short transverse vein about half way to the fork of the ulnar; radial forked a little before the outer ulnar; apical areoles eleven, the first three beyond the large stigma transverse. Wings with two transverse veins and two stylate apical areoles. This genus is distinct by its broad convex ecarinate front, broad vertex, the form of the lateral carinæ of the pronotum and the unarmed hind tibiæ.

Type of the genus *Platycixius calvus* n. sp.

223. *Platycixius calvus* n. sp.

Vertex equally long and broad, slightly narrower before and feebly arcuated at apex, the median carina not attaining the apex. Front broadest a little beyond the middle, the apex feebly curved across the base of the clypeus. Pronotum hardly half the length of the vertex, deeply angularly emarginate behind. Mesonotal carinæ subparallel, the median obsolete on apical third. Elytral nervures very obscurely granulated. Length to the apex of the abdomen 5 mm., to tip on the elytra about 6½ mm.

Color black, head, pronotum and legs luteo-testaceous, the former with a blackish shade about the frontal ocellus which extends down either side of the clypeus leaving a pale convex median vitta which is scarcely carinate. Narrow margin of the abdominal ing with the apex of the lateral carinæ at the hind margin. Mesonotum large, tricarinate. Basal joint of the antennæ large, subglosegments pale. Elytra faintly smoky hyaline, nervures strong, fuscous, a faint fuscous cloud along the apex and a crescentic fuscous mark on the seventh to the tenth apical areoles; stigma large and fuscous, becoming black at either end with a white callous within the base. Wings hyaline, nervures brown.

Described from one female specimen taken near a small stream at Mussey's, on April 12th, 1914.

224. *Microledrida fuscata* n. sp.

Closely allied to *asperata* Fowler but shorter and darker in color. Length 2½ mm.

Vertex produced for one half its length before the eyes, its carinæ strong. Front rather strongly inflated, distinctly transverse, the carinæ distinct but not as strong as those of the vertex, the frontal ocellus barely indicated. Clypeus long, acutely triangular, its basal suture regularly arcuated. Pronotum about one half the length of the vertex, its margins nearly parallel, median carina strong. Mesonotum longer than the vertex, tricarinate, the median feeble. Elytra broad, strongly inflated near the base, the sides almost straight for a space, apex subangularly rounded, with ten areoles beyond the stigma, the fifth and eighth small and triangular; nervures strong, punctate. Male genital segment broadly excavated the base of the sinus sometimes with a feeble tooth; stiles divergent at base, converging above leaving an oval opening, the subacute inner angle of the hammer-shaped apices in contact, their apical margins sinuated, not arcuated as in *asperata;* pygofers a little exceeding the plates.

Color fuscous-brown, obsoletely irrorated with pale on the head, pronotum and scutellum; clypeus, femora and abdomen black or nearly so, sometimes white pruinose; the latter with margins of the segments narrowly touched with fulvous. Anterior and intermediate tibiæ pale, tipped with fuscous. Elytra whitish, nearly opake, nervures and stigma fuscous, the former with large black punctures bearing black bristles; anterior fracture of the stigma white; apical margin with a fuscous spot at the tip of each nervure. In fully colored individuals there is a fuscous cloud at the base of the corium covering the basal disk of the clavus; two equidistant oblique fuscous spots on the costal area, the anterior of which may be continued behind in a large discal spot, and a rather vague smoky cloud across the base of the membrane, intensified on the stigma and base of the median apical areole. In pale examples the median fuscous band may be reduced to two spots on the costa, one on the disk, and a point at the apex of the clavus, and the posterior band to the two intensified spots. Commissural nervure always whitish.

Described from numerous examples beaten from a bush of Heteromeles (Christmas berry) at Alpine, San Diego Co., Calif., March 11th, 1914. These specimens may be slightly brachypterous which would account for their elytra being shorter than in Fowler's figure, but the color of the body and legs is much darker, the elytra are more maculated and the form of the male genitalia is different.

225. *Myndus occidentalis* n. sp.

Allied to *radicis* Osb. but more deeply colored; luteus to fulvous-yellow; front immaculate; elytral nervures dark. Length 4 to 4½ mm.

Vertex long as in *radicis* but less narrowed anteriorly. Front proportionately narrower than in *sordidipennis*, the sides not so strongly angled as in *radicis*. Pronotum reduced to a mere line at center. Elytral nervures infuscated and distinctly punctate as in *sordidipennis* but the costal nervure not heavier and the stigma hyaline, its basal nervure only thickened and brown. Last ventral segment deeply excavated with a blunt tooth in the fundus, the sides parabolic; pygofers of the male long, exceeding the connexival segments by at least a third of their length, the apical margin but slightly oblique; anal style black and considerably surpassing the tube.

Color fulvous, a little paler on the head, pronotum and legs; front immaculate. Elytra and wings hyaline with the nervures distinctly brown. Eyes, sides of the metanotum, an area on the tergum and the tarsal claws blackish.

Described from four male and three female examples taken at Lakeside in May 1913. Some of the specimens are darker or almost testaceous brown and it is possible that they represent the fully adult coloration.

226. *Oecleus decens* Stal. The species which I have so determined is not uncommon back from the coast from May to August. It differs from the eastern *borealis* in being larger and in having a somewhat different male genitalia. The color is darker than described by Stal but we find the same range of color in a number of allied Cixiinæ. I prefer to place this form under *decens* until comparison with Mexican material is possible.

227. *Oecleus venosus* Van D. Several examples taken along the San Diego river at Lakeside and back of the sand dunes at Ocean Beach, all in May 1913.

Genus Oeclidius n. gen.

Vertex narrow as in *Oecleus* but widest at base and not at apex as in that genus. Front very narrow, concave, uniformly widening from the base to the clypeus, the carinate margins well elevated; median carina and apical ocellus wanting, the position of the latter sometimes indicated by a dark point. Clypeus slender, tricarinate. Pronotum narrow, angularly emarginate behind, with median keel and concentric anterior carina behind the eyes. Mesonotum tricarinate. Basal joint of the antennæ longer than wide, papillose. Hind tibiæ simple. Eyes notched beneath. Elytra short and broad, vitreous, the two claval veins straight, united before the middle, at tip reaching the commissure by a hook some distance from the apex; costal area very broad and expanded near the base; outer sector forked near its base and both opposite the apex of the clavus where they are united by strong transverse veins forming five anteapical areoles of which the inner and third are small and triangular. Middle apical areole elongate, oblong, interior to which are five (two stylate) and exterior four, their three veins springing from the side of the long median areole. All the nervures distinct, impunctate.

This genus differs from *Oecleus* in having the vertex narrower before, in the narrower ecarinate front the papillose basal joint of the antennæ, the angularly emarginate pronotum and the elytral venation. It bears some resemblance to *Micrixia* Fowler but can at once be distinguished by the narrower vertex and front and different elytral venation. It bears a superficial resemblance to *Brixia* but has not the elongated second joint of the antennæ found in that genus.

228. *Oeclidius nanus* n. sp.

Closely resembling *Oecleus tenellus* Fowler, which doubtless pertains to this genus, but smaller. Length to the tip of the closed elytra 3½ mm.

Vertex attaining the front line of the eyes, the base of the frontal carinæ only projecting; deep black, the carinæ white, hind margin of the eyes flavous. Front and clypeus testaceous, the strong lateral carinæ of the front paler; ocelli black. Rostrum reaching the last ventral segment, infuscated at apex. Pronotum white with the disk behind the eyes black. Mesonotum black, the

and meta-pleura infuscated on their disk. Abdomen black the extreme apex and larger lateral angles fulvous; carinæ pale; meso-margins slenderly pale. Legs soiled testaceous, the tarsal spines infuscated. Elytra faintly hyaline-smoky, the nervures fuscous, those at apex stronger, the transverse nervures more heavily infuscated, with a larger smoky spot behind the stigma and another beyond the apex of the clavus. Wings vitreous with fuscous veins.

Last ventral segment of the male with a deep oblong sinus including most of the genitalia; pygofers slightly emarginate below, the stiles ligulate and approximate, at their apex extended laterally, and truncate, their apex considerably exceeded by the narrow pygofers.

Described from numerous examples swept from weeds, grasses and low bushes at East San Diego, La Mesa, Lemon Grove, Lakeside and Alpine in San Diego County, California, during April and May 1913.

229. *Dictyssa marginepunctata* Melich. Of this nearly black species I have taken single examples at San Diego, Lakeside, Mussey's and in the Cuyamacas, May to October. Taken on Adenostoma.

230. *Dictyssa obliquua* Ball. May to August. Common. This and the following species are to be found on sage brush, Artemesia.

231. *Dictyssa mutata* Melich. Common in May.

232. *Dictyssa fenestrata* Ball. La Jolla, June 25th, 1913; three examples.

233. *Dictyssa transversa* n. sp.

Small, pale grey; Elytra hyaline, veined with brown and crossed by two brown vittæ. Length 2½ mm.

Cinerous brown; front brown with whitish carinæ boarded with darker. Vertex, pro- and mesonotum varied with darker and with the median carinæ obscurely paler; abdomen dark brown. Elytra whitish hyaline, reticulated with brown nervures and crossed by two narrow transverse brown vittæ; the anterior at about the middle and more or less interrupted, the posterior just beyond the tip of the clavus, entire but somewhat irregular. The front a little narrower than in *mutata*.

Described from numerous specimens mostly taken on the slopes of Mt. Soledad at La Jolla, from September to November. Also taken at Alpine in March and October and at Torrey Pines in June. The closely reticulated hyaline elytra and the small size will distinguishe this species. Like most of its congeners it lives on Artemesia.

234. *Naethus fenestratus* Melich. Mussey's and Alpine, June to August. On oaks in the chaparral.

235. *Naethus nigronervosus* Melich. June to October. Abundant on scrub oaks.

236. *Dictyobia permutata* Uhler. Foster, May; one example.

237. *Dictyobia atra* n. sp.

Size and form of *permutata;* deep black with a few pale marks on the carinæ and sutures, the elytra areolate with whitish-hyaline. Length 4-5 mm.

Closely allied to *permutata* and presenting no really good structural characters. It may, however, be readily distinguished by its velvety black color, especially on the elytra, becoming somewhat fuscous on the head, pronotum and scutellum with the carinæ slenderly and interruptedly edged with pale; disk of the front on either side and the clypeus brownish and there is a row of pale points near the lateral carinæ of the front, sometimes obscure; meso- and metasternum whitish. Pleural pieces more or less edged with pale; tip of the coxæ, knees and tarsi in part also pale. Abdomen black, the genital pieces and adjoining segments edged with pale; extreme tip of the mesosternum conspicuously pale. Elytra closely reticulated, the pale vittæ obscured by black veinlets; none of the pale areoles materially larger as they are in *permutata.* These pale areoles form a diagonal vitta from the middle of the clavus to the costa behind the middle; this vitta is expanded on the costa and constricted or almost broken at the middle where it sends a branch consisting of two areoles toward the inner apical angle. There is a pale spot consisting of from four to five areoles on the costal margin almost midway between the end of the vitta and the base. The costæ and apical margins have a row of white marks which become more regular and oval around the apex, and within this row at apex are two or three larger white areoles. All these markings consist of small whitish-hyaline aeroles separated by the black veinlets.

Described from numerous examples taken on the chaparral from May to July, particularly at Alpine. This may be but a color variety of *permutata* but it is as distinct as are the several species of *Dictyssa.*

238. *Danepteryx manca* Uhler. Abundant everywhere on Adenostoma and Artemesia. It comes to maturity about April 1st but specimens may occasionally be found throughout the autumn and winter. This species varies from a fulvous brown to dark fuscous and sometimes a dorsal stripe and the elytra are whitish or grey.

239. *Acanalonia mollicula* n. sp.

Form of *clypeata* nearly but with the elytra more narrowed toward their apex. Pale green or brownish with the sutural and apical margins slenderly brown. Length 5-6 mm.

Vertex as in *clypeata,* distinctly subangularly produced, a very little longer on the middle than next the eye, slightly depressed on the disk, the anterior edge rounded. Front prominent basally, transversely convex, broader than its greatest length, deeply, angularly excavated for one half its length to receive the base of the clypeus. Pronotum scarcely as long as the vertex and like that obsoletely carinate. Mesonotum with the lateral carinæ feeble but descernable. Elytra nearly half as wide as long, costa strongly

rounded on the basal one third where they are widest, then narrowing and more feebly arcuated to near the apex which is regularly arcuated to the apex of the clavus. Costal area basally nearly twice the width of the first discal areole; reticulating nervures fewer than in *clypeata*.

Color dull green, or brownish in immature examples, with the costal margin broadly paler at base becoming nearly brown about the apex and still darker on the commissure of the clavus. Legs and clypeus pale brown; eyes dark brown.

Described from six examples, representing both sexes, taken in the country back of San Digo, California, mostly on the hills along Mussey's Grade beyond Foster, August 4th and 5th, 1913; one from Alpine at an altitude of 2,000 feet on October 4th, and one from the Cuyamaca mountains on October 5th at an altitude of 5000 feet.

This is nearest *clypeata* but the larger size and rounded base of the clypeus will distinguish that species. These both have the apex of the head a little produced but less so than in *conica* Say.

240. *Ormenis infuscata* Stal. San Diego and Alpine, May to July.

Rhynchopteryx n. gen.

Allied to *Cyarda* but much shorter; elytra scarcely longer than broad, produced in an abrupt tail at apex of the clavus.

Head bluntly conical, the vertex flat, a little depressed along the disk, passage to the front rounded. Front transverse, ecarinate, but little wider than long; sides narrowly foliaceous-carinate, feebly arcuated, apical margin a little concave; clypeus ecarinate. Pronotum shorter than the vertex rounded before, feebly subangularly excavated behind. Mesonotum about one and one half times the length of the pronotum, obsoletely bicarnate. Elytra scarcely longer than broad, much inflated, valvate, meeting below from the cauda nearly to the middle; the curve of the costa almost a parabola in the male, more oblong in the female; commissural angle produced in an abrupt lanceolate process; base of the clavus strongly granulate and there are a few scattering granules in the apical areoles; commissural margin of the clavus smooth and depressed and connected with an oval depressed area at about the middle of its length. Neuration reticulate over most of the surface, the longitudinal nervures scarcely traceable; transverse nervures of the costal area more regular; ulnar tubercle and base of the clavus prominent. Hind tibiæ with one tooth.

Type *Rhynchopteryx caudata* n. sp.

Differs from *Cyarda* by the broader front, longer vertex, shorter pro- and mesonotum and the short gibbous caudate elytra.

241. *Rhynchopteryx caudata* n. sp.

Dull testaceous brown varied with fuscous. Length to the tip of the cauda 4½-5mm.

Front impressed at apex; vertex with an impressed point on either side near the eye; pronotum scarcely reaching the middle of the eye; apex of the clavus prominent, rounded, surpassing the

apical margin of the corium; cauda lanceolate, extending beyond the tip of the clavus for three or four times its width at that point.

Color dull yellowish or testaceous brown varied with darker or fuscous; base of the front darker, a broad brown vitta extends from near the apex of the vertex to the tip of the mesonotum, sometimes including a pale median line. Generally the elytra are darker above with a fuscous cloud on the base of the clavus and about three along the middle of the corium, and there are two rows of brown points toward the costa. Cauda fuscous with a pale mark behind the apex of the clavus. Abdomen fuscous with the edges of the segments paler. Tip of the rostrum black. Whole insect more or less pruinose at times.

Described from numerous examples swept from wild sunflowers at La Jolla, Calif., in August, 1913. Very distinct by its broad valvate elytra abruptly produced in a short tail at apex.

242. *Lamenia californica* Van D. Taken on willows at Lakeside and Musseys, May to August.

243. *Megamelus marginatus* Van D. Coronado, June.

244. *Pissonotus marginatus* Van D. San Diego, December. One male with black femora and tibiæ.

245. *Pissonotus delicatus* Van D. April to June. Swept from a fine grass growing on low spots. This species was described from a pale female; they are mostly darker.

246. *Pissonotus frontalis* Crawf. Seven examples which seem to be correctly referred here were taken on grass growing along water courses from San Diego to Alpine. They differ from *aphidioides* in being a little smaller, in having the frontal carina forked on a line with the lower angle of the eyes, the branches parallel, closely approximate and obscure over the apex of the head; antennæ black beneath, apex of the front narrowly pale. The styles of the male are not "spatulate" but are transverse at apex as figured by Mr. Crawford, with their inner angles acute and black. This genus is quite distinct from *Dicranotropis*.

247. *Stobaera tricarinata* Say. Common, throughout the year.

248. *Stobaera concinna* Stal. Grossmont, in low lands near the flume. May. Crawford unites this species, *affinis* and *minuta* with *tricarinata* but they are quite distinct.

249. *Stobaera minuta* Osb. Alpine and Torrey Pines, May and June. In these the orange dorsal vitta is conspicuous.

250. *Stobaera bilobata n. sp.*

Much smaller than *tricarinata* with the elytra fuscous marked with a bilobate costal area. Length 1½ to 2 mm.; macropterous 2¾ mm to tip of the elytra.

Head narrower than in *tricarinata;* fovæ of the vertex deep; front narrow, much constricted above, the sides slightly concavely arcuated. Lateral carinæ of the pronotum strongly arcuated, at-

taining the hind margin a little exterior to those of the mesonotum. Macropterous elytra a little shorter than those of *tricarinata*. Male styles divergent and curved, tapering gradually from base to near the apex where they are abruptly bent and narrowed to an acute point, the points meeting above an ovate opening. Anal tube without ventral prolongations on either side. Tibial spur narrower than in *tricarinata*, scarcely more than half the length of the first tarsal joint.

Color variable as in *tricarinata*, in fully matured examples testaceous tinged with yellowish on the head, above blackish. Front obscurely dotted with pale especially toward its base; vertex immaculate or the carinæ paler, the eyes anteriorly pale or subcarneous. Pro- and meso-notum smoky or almost black, the carinæ touched with paler. Tergum dusky either side or at times almost black. Elytra smoky becoming nearly black on the base of the clavus and the inner base of the corium and on the square stigma; costa broadly white, divided into two lobes at the stigma, the basal lobe sloping off to the base of the costa, the apical subtriangular, occupying about half the membrane; nervures concolorous, sparingly dotted with black; commissural nervure white broadly interrupted with black on the apex of the clavus. Tips of the tarsal claws black. In pale examples the elytral markings become indistinct.

Described from numerous examples representing both sexes, taken at Alpine, Mussey's and Torrey Pines from June to August. I have tried to identify this form with *nigripennis* Crawford but it seems to be entirely distinct. All the carinæ are very sharply defined in this species. The Torrey Pines specimens were taken on Biglovia.

251. *Liburnia consimilis* Van D. April to June. Abundant along water courses.
252. *Liburnia lineatipes* Van D. Lakeside, May.
253. *Liburnia occlusa* Van D. Lakeside and La Mesa, May to June.

Family CICADIDAE

254. *Proarna crepitans* n. sp.

Allied to *maura*, smaller and darker than *valvata*. Length to tip of abdomen 22 mm. to tip of elytra 34 mm., alar expanse 62 mm.

Male: Head as wide as the anterior lobe of the pronotum; front strongly striated, without median sulcus. Sides of pronotum strongly sinuated; humeral angles less produced and more rounded than in *valvata;* anterior lobe more angled. Rostrum reaching onto the hind coxæ. Opercula large, rounded apically, the sides quite strongly sinuated. Last ventral segment long, subtriangular, its apex roundedly emarginate; valve shorter than the last ventral segment, ovate, apex somewhat compressed and almost emarginate, dorsal aspect of the genital segment produced in a prominent subacute tooth, shorter and more angled than in *valvata*.

Color black. Vertex with three obscure pale marks on the posterior margin, another on the antennal ledge and a transverse one on the base of the front superiorly; front pale or fulvous with

a median wedge-shaped black vitta with its point on the base of the clypeus, superiorly nearly attaining the antennal ledges and bisected by a pale median line; clypeus pale, black at apex. Antennæ black, becoming pale at apex. Rostrum pale, black at apex. Pronotum with the hind margin broadly and the sides slenderly obscure castaneous-brown; two approximate points near the hind margin and a larger one in the depressed submarginal area on either side castaneous. Metanotum with the center of the cruciform callous and a mark at each of its four extremities pale or castaneous. Tergum with a small pruinose spot on either side of the third segment; genital segment pruinose. Elytral nervures pale or castaneous slenderly edged with black; costal nervure black. Beneath and legs pale; disk of the pleural pieces, upper surfaces of the coxæ and femora, a spot on the base and apex of the tibiæ, tarsal claws and the connexivum black, the edges of the connexival segments pale. The pale color on the lower surface may be more or less tinged with fulvous or castaneous. Basal nervures of the second and third apical areoles of the elytra with a conspicuous fuscous spot.

Described from seven male examples taken in Mission Valley on the hillside opposite the city of San Diego, July 9th 1913. This species makes an unusually loud crackling noise which is often repeated and well sustained, but the insect was very active and difficult to capture, especially as its home was among the cactus on the steepest part of the hill.

I have a Mexican *Proarna*, perhaps *maura*, which is very near this but it is larger with the pale markings above more extended, the antennæ are pale, the rostrum black with the basal joint only pale, the legs and venter mostly fuscous and the genital characters are different. In both species the colors beneath are much obscured by an abundance of white pruinescence.

255. *Okanagana vanduzei* Dist. Taken in the back country only; Sweetwater Valley, June 19th, 1913; Alpine, June 8th and July 4th, 1913. I have found only the males. One of these was singing in the mouth of its hole and beneath it was a cottony mass which did not contain eggs and the nature of which I have been unable to make out. This species had a loud, shrill and continued note.

256. *Okanagana vanduzei* var. *consobrina* Dist. Abundant everywhere along the coast and extending up the valleys for a mile or two and at San Juan Capistrano at least five miles; May 22nd to July 25th. This species has a shrill thin continued note and is not difficult to locate. Like the preceding it sings within its hole but near the surface of the ground. Ordinarily however it rests on grass or weeds near the ground while the preceding is found on the chaparral.

257. *Okanagana californica* Dist. Taken from Eriogonum and Artemesia bushes growing on the adobe lands at Alpine, June 21st to July 4th, 1913. It is a slighter and much more clearly marked species than the foregoing.

258. *Okanagana blaisdelli* Uhler. There are two quite distinct forms taken here which have evidently been confused by Dr. Uhler in drawing up his description. I have one specimen which I believe represents the true *blaisdelli* as it agrees with Uhler's description in being "long, narrow and parallel sided." It also agrees in the remarkably heavy elytral venation and in most of its other characters. It disagrees in the form of the last ventral segment which is here quite regularly narrowed to a scarcely emarginate narrow apex and in having the yellowish color less extended on the head and pronotum. The size given by Dr. Uhler covers both of these forms so it has little value; my specimen corresponds almost exactly with his smallest dimensions. My single male specimen was taken at Alpine, June 20th, 1813, from the chaparral.

259. *Okanagana dstanti* n. sp.

This species is much broader and stouter than the form determined above as *blaisdelli*, being fully as broad as *rimosa* and *vanduzei*. It differs from *blaisdelli* as restricted above, aside from its form, in having the sides of the pronotum anteriorly more rounded and scarcely if at all crenulated and in having the opercles regularly rounded at apex or at most very obscurely sinuated. The elytral nervures while heavy are much less so than in *blaisdelli* and are mostly pale. The pale colors of the whole insect are more extended and the posterior pair of pale spots on the disk of the mesonotum are larger posteriorly and enclose a black point.

This is evidently a still plastic species of which I have taken three forms or varieties here. What I call the typical form is common on the high pueblo lands between La Jolla and Torrey Pines during late May and early June. It is larger measuring 25 mm. to the tip of the abdomen and 33 to the apex of the elytra with a pronotal width of 11 mm. making it the broadest of our species. Here the sides of the pronotum while deeply sinuated are little expanded anteriorly, the last ventral segment is long and regularly narrowed to the rounded apex and the nervures of the elytra are pale before the nodus, excepting only the first ulnar.

Another form which I propose to call (260) var. *truncatus* occurs in numbers about the city of San Diego during June. It has the last ventral segment broad and truncated at apex which is more or less inclined to be sinuated, sometimes strongly so, the sides of the pronotum are more deeply sinuated and strongly expanded anteriorly, and the second ulnar nervure only is black, in whole or in part, before the nodus. It is smaller than *distanti*.

A third form which I propose to call (261) var. *pallidus* is still smaller measuring but 22 mm. to the tip of the abdomen and 30 to the apex of the elytra. It has the last ventral segment long and truncated but not at all sinuated at apex, the sides of the pronotum are but little sinuated and not at all expanded anteriorly, and the colors are much paler, the yellowish markings being much extended, especially on the pronotum where they cover a large part of the

surface, the elytral nervures are almost entirely pale to the base of the apical areoles. This form has been taken only on the low ground near the coast at National City in June.

This species as a whole has the elytra wider than in *blaisdelli* with the costa quite distinctly bent at about the middle. It is a powerful flyer and makes a loud rattling noise at intervals of from ten to thirty minutes, depending apparently on the strength of the sunshine. One will start sounding and the impulse will spread to others near until the whole field is flooded with an indescribable din. After from fifteen to thirty seconds it will stop about as it started. This peculiarity of shrilling makes it all but impossible to locate their sound and with hundreds about you it is hard to find one.

262. *Tibicinoides cupreo-sparsa* Uhler. This very pretty little species was abundant this season from April 26th until nearly the first of June. It occurs almost exclusively on a certain fine tufted grass, probably a Poa, growing on the hillsides about La Jolla and up Mission Valley and adjacent canyons as far as the old Mission and perhaps farther. The The bright red on the base of the wings gives this species a lively appearance when spread. Like *hesperia* Uhler it has the basal one half of the elytra infuscated. It has a shrill but feeble note which is long continued and easy to locate but can rarely be heard for more than one hundred feet.

263. *Platypedia minor* Uhler. Exceedingly abundant everywhere near the coast this season and not uncommon as far back as Alpine. The first specimens were taken on March 22nd and occasional specimens were found as late as July. It makes a short peeping noise constantly repeated but it is not an easy sound to locate. It varies much in size and seems to prefer grassy places.

Family APHROPHORIDAE

264. *Aphrophora angulata* Ball. San Diego, Lakeside and Alpine. May to July. Taken on willow.

265. *Clastoptera obtusa obtusa* Say. Alpine, October; one example.

266. *Clastoptera obtusa achatina* Germ. Beaten from pine trees in the Cuyamacas in October, 1913.

267. *Clastoptera lineaticollis* Stal. May to October, not uncommon.

Family MEMBRACIDAE

268. *Ceresa bubalus* Fabr. Occasional on willows but not as abundant as in the east.

269. *Ceresa albidosparsa* Stal. May to October, common.

270. *Stictocephala inermis* Fabr. One male taken in San Diego, January 1913.

271. *Stictocephala festina* Say. Abundant everywhere on alfalfa throughout the year; the var. *rufivitta* occasional with the typical form.

272. *Stictocephala nigricans* n. sp.

Form of *collina* but smaller with the clypeus more produced; greenish fuscous or almost black, usually distinctly dotted with pale. Length 5½ to 6 mm.

Head unusually flat and regularly rounded before, the clypeus scarcely advanced beyond the line of the cheeks; surface not perceptably rugose, with a distinct incised median basal line. Pronotum much depressed as in *gillettí*, the acute decurved apex almost reaching the tip of the abdomen; metopidium moderately convex, its sides narrowing from the base, curving back and meeting behind the middle. Elytral nervures strong, subinfuscated. Last ventral segment of the female deeply cleft almost to its base, the sides of the sinus arcuated nearly to the lateral angles. Color normally greenish fuscous, mottled or dotted with pale. Metopidium paler and at times without the mottling. Face usually pale with the tylus and apex of the cheeks blackish and there may be three darker basal clouds. Body beneath black; rostrum, legs and apex of the genital segment in both sexes pale.

Described from numerous specimens swept from alfalfa on which it is almost as abundant throughout the year as is *festina*. This species seems to be very near Fowler's *fusca* but his figure shows an insect with a higher pronotum with the metopidium conspicuously widened upward for some distance from the base; he also describes the abdomen as pale while it is black in even the palest specimens I have of *nigricans*.

273. *Parantonae hispida* n. sp.

Pale testaceous or yellowish, obscurely marked with ferruginous and dotted with black; pronotum semivitreus and with the head armed with long erect bristles. Length 6 mm.

Head uneven, polished; anterior edge slightly recurved, truncate on either side of the clypeus and rounded toward the eye; clypeus large and tumid at base. Pronotum moderately elevated; obscurely punctate or subareolate, divided into three lobes by transverse impressions, the anterior less profound; anterior lobe tumid either side above the obtuse humeral angles; no supra-humerals; intermediate lobe smaller, ovate, compressed below where there is a bulbous expansion next the margin; posterior lobe less inflated, subglobose, broader than high, in the male about attaining the tip of the abdomen, armed behind with an abrupt slender spine which reaches the apex of the inner areole of the elytra. Head and pronotum armed with long stiff black bristles interspersed with slightly shorter pale ones, the black ones about as long as the distance between the ocelli and eyes. Elytra entirely hyaline, with strong nervures. Last ventral segment of the female deeply, broadly emarginate almost to its base.

Color pale flavo-testaceous, the pronotum semivitreus, more

or less distinctly mottled with ferruginous omitting the unarmed compressed sides of the median lobe, the terminal spine pale with the extreme tip and a subapical annulus black. Both the anterior and posterior lobes may at times be marked with black above. Head with twelve black points; three against each eye, four on the base of the clypeus and two between and above the ocelli, any or all of which may be wanting. Elytral nervures sometimes touched with brown in places. Legs pale marked with seven black points, two on each side of the femora, two on the base of the tibiæ exteriorly and one at its apex. Tergum marked with a black or brown point on either side at base or the disk may be almost wholly black in the male. Venter sometimes infuscated or even black in the male.

Described from numerous specimens taken on Malvestrum during May and June. This peculiar looking Membracid differs from the only previously known species by the semivitreus texture of the pronotum, the longer and stiffer hairs and by the proportionally smaller posterior lobe of the pronotum, but it is very close to this genus and I believe can best be placed there.

274. *Micrutalis occidentalis* Godg. Taken in great numbers on a graceful branching Chenopodium having a powerful sickening odor and growing commonly on the sandy flats at Lakeside, Mussey's etc., July and August. The form described as *binotata* by Goding is a mere color variety found everywhere with the pale form and scarcely deserving a varietal name.

275. *Micrutalis parva* Godg. Large numbers of this species were taken on the common oak mistletoe at Pine Hills in October. Its smaller size and more depressed form will best distinguish it from the preceding, but other characters may be found in the shorter face and the narrower sinus of the last ventral segment of the female. The prevailing color of this species is a greenish-white less tinged with fulvous than is the preceding; the black marked form occurring with the pale but in less abundance than in *occidentalis*.

276. *Telamona pruinosa* Ball. Five examples taken on scrub oak at Alpine in June and one from willow at Santa Ysabel in October. Those from the oak are a little smaller and greener than the typical form from the east but I do not think them distinct.

277. *Telamona declivata* Van D. One example beaten from alder trees in the Cuyamaca Mts. at an altitude of 5000 feet in October 1913. It is a little more green than eastern specimens with the humeri rather less prominent and the dorsal hump wants even a trace of the hind angle, but I can find no specific characters by which to separate it.

278. *Telamonanthe rileyi* Godg. Not uncommon on oaks from April to August.

279. *Cyrtolobus limus* Van D. A form which I cannot distinguish from this species is not uncommon on oaks at Alpine and Mussey's from April to October.

280. *Platycotis minax* Godg. Taken occasionally on oaks but not at all common. *Platycotis asodalis* Godg. is the unarmed form of this species.

281. *Philya californiensis* Godg. Shorter and broader than *dubia* but with the pronotal horn more elevated and compressed; the whole surface rough, obscurely pitted and transversely corrugated. Sides of the protuberance strongly compressed with the nodular apex broad with distinct carinæ. Dorsal carina when viewed from above wavy and interrupted by the pitting of the surface; posterior process with a distinct lateral carina which in the female is bifurcated; the lateral carinæ of the protuberance are very prominent or subfoliaceous toward the apex but below become lost in the corrugations of the surface; the frontal carina prominent and corrugated. Apex of the front tumid, the cheeks forming a small but obvious lobe on either side. Clypeus convex, nearly horizontal. Elytra entirely coriaceous and punctured, the nervures much reticulated especially beyond the middle. Color brownish grey a little mottled along the median carina with groups of fuscous punctures. Length 7 mm.

In July, 1914, I found this species on a bushy composite plant growing commonly in low places at San Diego. This plant has white flowers like an Ageratum and a plumose foliage which keeps very green throughout the dry season. Goding's description of this insect is absolutely unrecognizable. Our insect is not ferruginous or mottled with pale toward the apex or tuberculate as described by Goding, but it is more robust with the anterior horn shorter and more elevated and with a slight sinus at its base and the elytra are coriaceous. These are all the characters Goding mentions but I feel little doubt but this is the insect he had before him.

I have another *Philya* from the same lot from which I sent specimens to Goding on which he founded his *Aechmorpha ferruginea* but it would be impossible to recognize that species from his description. It is to be hoped that Goding's collection will eventually fall into the hands of some entomologist who can redescribe his species so they can be recognized.

Family TETTIGONIELLIDAE

Subfamily PAROPINAE

282. *Koebelia interrupta* Ball. Not uncommon on the chaparral from March to September. My material varies greatly in color but apparently we have but one species. I am unable to separate this genus satisfactorily from *Paropulopa* Fieb.

Subfamily BYTHOSCOPINAE

283. *Agallia oculata* Van D. Fairly abundant on elderberry trees which seem to be its native food. I have found the larvæ about half grown in June.

284. *Agallia 4-punctata* Prov. Lakeside and Mussey's. May to August. Mostly paler in color than eastern specimens.
285. *Agallia sanguinolenta* Prov. San Diego, Mussey's and Alpine, May to August. Smaller and darker than eastern specimens.
286. *Agallia cinerea* Osb. & Ball. Alpine and Mussey's. June to August; not common.
287. *Agallia californica* Baker. Common throughout the year.
288. *Agallia lyrata* Baker. Occasional throughout the year.
289. *Idiocerus amoenus* Van D. Taken on cedar in the Cuyamaca Mts. in October. Also taken at Mussey's in April.
290. *Idiocerus nervatus* Van D. Taken on cedars with the preceding.
291. *Idiocerus verticis* Say. Also taken with the foregoing on cedars.
292. *Idiocerus sp.* Found on Monterey cypress in the city park in January, 1913.
293. *Idiocerus snowi* Gill. & Baker. May to August. Found on willows.
294. *Idiocerus sp.* Common.
295. *Idiocerus sp.* Common on Ribes speciosum and on the chaparral. I have also taken it on Rhus integrifolia. May to August.
296. *Macropsis occidentalis* Van D. San Diego and Alpine; occasional on willows during May and June. I found it at San Juan Capistrano on willows in great numbers, June 24th, 1914.
297. *Macropsis nubila* Van D. Alpine, June. I cannot find that genus *Oncopsis* is represented on the west coast.
298. *Bythoscopus robustus* Uhler. Alpine and Mussey's, March to August. I took it at Torrey Pines in June in great numbers on a shrubby composite plant allied to Solidago.
299. *Bythoscopus franciscanus* Baker. Common throughout the year; found largely on a shrubby sunflower.
300. *Bythosopus atra* Baker. A few taken on the Cuyamaca Mts. in October.

Subfamily TETTIGONIELLINAE

301. *Oncometopia lateralis* Fabr. What I believe to be a form of this species is found ocasionally on grasses and weeds along water courses among the hills. It is smaller and greyer and has the vertex more produced than the eastern form.
302. *Homalodisca liturata* Ball. Mussey's, April 11th, 1914, on the rocky hillside.
303. *Tettigoniella hieroglyphica* Say. Two forms of this species. one of them very near to *confluens* Uhler, are common throughout the year.

304. *Tettigoniella gothica* Sign. Abundant everywhere throughout the year.

305. *Tettigoniella circillata* Baker. Found on Xanthium strumarium and other weeds growing in low rich ground. May to October.

306. *Tettigoniella sp.* Common everywhere in gullies and canyons where there are damp spots overgrown with a fine grass. June to October.

307. *Draeculacephala mollipes* var. *minor* Walk. Common throughout the year in damp places.

308. *? Errhomenellus irroratus* Ball. March to May, on Adenostona. This does not agree with Dr. Ball's description but I cannot think it distinct.

309. *Gypona cana* Burm. May to October; not uncommon.

310. *Gypona angulata* Spangb. Alpine and Grossmont; May to October.

311. *Xerophloea viridis* Fabr. Alpine; June to October; both the grey and green forms.

Subfamily JASSINAE

312. *Uhleriella coquelletti* Van D. Taken in abundance on Arctostaphylos bicolor at East San Diego in May and June, 1913. Less abundant in 1914. Occasional at Alpine and elsewhere.

313. *Huleria 4-punctata* Ball. May to July; generally distributed and not rare.

314. *Aligia inscripta* Van D. May and June; not uncommon.

315. *Aligia sp.* Abundant on sage brush (Artemesia) on the hills near the Scripps Institution at La Jolla, June to September.

316. *Mesamia straminea* Osb. Foster and Mussey's, April and May. Pine Hills in October.

317. *Platymetopius nigriviridis* Ball. Swept from grass in Balboa Park, San Diego, Febr. 9th, 1913.

318. *Platymetopius majestus* Ball. Lives on Heteromeles; Alpine, June; The "Willows," October, with the young; Torrey Pines, July.

319. *Platymetopius elegans* Van D. On oaks, March to October; young in May. I took one example at Sevenoaks, Fla., in May, 1908.

320. *Platymetopius acutus* Say. May, common.

321. *Platymetopius acutus* var. *dubius* Van D. Not uncommon of the chaparrel at Alpine and elsewhere.

322. *Platymetopius slossoni* Van D. Mission Valley at San Diego, April; Cuyamaca Mts. in October on Rhus diversiloba.

323. *Platymetopius frontalis* Van D. Cuyamaca Mts., near Descanso, October.

324. *Platymetopius nasutus* Van D. Alpine, June; one example.

325. *Platymetopius loricatus* Van D. Mussey's, April 12th, 1914.

326. *Platymetopius irroratus* Van D. Common everywhere, February to June.

327. *Platymetopius fuscifrons* Van D. Alpine and Mussey's April to June.

328. *Deltocephalus cinereus* Van D. San Diego and Alpine, February to May; on grass.

329. *Deltocephalus melscheimeri* Fitch. La Mesa and Alpine, February to June.

330. *Deltocephalus fuscinervosus* Van D. Abundant everywhere and at all seasons.

331. *Deltocephalus vanduzei* Gill. & Baker. This shining black little species is common here from April to June.

332. *Lonatura minuta* Van D. Coronado, March 11th, 1913; La Jolla, June 25th, 1913; lives on shore grasses.

333. *Euscelis exitiosus* Uhler. Common here as elsewhere throughout the year.

334. *Euscelis striola* Fallen. Low places at East San Diego, April.

335. *Eutettix subaenea* Van D. Taken on willows at San Juan Capistrano and will certainly be found in this county.

336. *Eutettix osborni* Ball. Occurs in great numbers on the Tamarix on the grounds of the Scripps Institution at La Jolla, July to September; a few were taken from the same bush at Alpine in October.

337. *Eutettix tenella* Baker. My records for this species show January, August and December.

338. *Eutettix pannosa* Ball. On black manzanita, Arctostaphylos bicolor, throughout the year.

339. *? Phlepsius personatus* Baker. This species, which I believe I have rightly determined, occurs occasionally throughout the year.

340. *Phlepsius ovatus* Van D. Taken occasionally throughout the year.

341. *Phlepsius extremus* Ball. La Jolla to Alpine; February to July.

342. *Phlepsius utahnus* Ball. La Jolla, one example swept from weeds.

343. *Phlepsius occidentalis* Baker. San Diego and Foster, May, taken on Heteromeles.

344. *Acinopterus acuminatus* Van D. Common everywhere throughout the year. The var. *viridis* Ball is less abundant.

345. *Scaphoideus bicolor* Ball. Alpine and Foster, May to June; not common.

346. *Scaphoideus scalaris* Van D. Common and generally distributed; April to October. Generally beaten singly from

bushes and trees.

347. *Scaphoideus blandus* Ball. Two examples taken at 5000 feet in the Cuyamacas in October.

348. *Scaphoideus scrupulosus* Ball. Grossmont, Alpine, etc., May to July. On Rhus integrifolia.

349. *Scaphoideus opalinus* Osb. One dark example taken in the Soledad Valley at Torrey Pines in June, 1914.

350. *Thamnotettix montanus* Van D. March to July, not uncommon.

351. *Thamnotettix coquilletti* Van D. Pine Hills, October, one example.

352. *Thamnotettix areolata* Van D. Cuyamaca Mts., October, one example.

353. *Thamnotettix heidemanni* Ball. Extremely abundant on a low spreading Polygonum along the coast at La Jolla, May to September. It varies greatly in the amount of red dotting.

354. *Thamnotettix geminata* Van D. April to May. Common on Malvestrum.

355. *Thamnotettix flavocapitata* Van D. La Jolla to Mussey's; April and May.

356. *Thamnotettix kirkaldyi* Ball. Common everywhere, especially on mallows.

357. *Thamnotettix unbricata* Ball. Alpine, one example.

358. *Thamnotettix atropunctata* Van D. Abundant on grasses throughout the year. It varies much in depth of coloring, but usually has a decided reddish cast.

359. *Thamnotettix vapida* Ball. Everywhere on Arcostaphylos bicolor, April to July.

360. *Thamnotettix gutturosa* Ball. With the last but less abundant. This is a stout heavy insect not all characteristic of the genus.

361. *Thamnotettix limbata* Van D. San Diego and Alpine; March to June; not common.

362. *Thamnotettix titusi* Ball. Common on sage brush, April to July.

363. *Thamnotettix vespertina* Ball. With the last and equally abundant.

364. *Thamnotettix visalia* Ball. Mussey's, August.

365. *Thamnotettix gloriosa* Ball. May to July, not uncommon.

366. *Thamnotettix gemella* Ball. Found everywhere on elder trees; April to July.

367. *Chlorotettix unicolor* Fitch. Foster and Descanso; May and October. These do not differ in any way from eastern material.

368. *Neocoelidia candida* Ball. Alpine and Mussey's; April to October; not common.

369. *Neocoelidia reticulata* Ball. San Diego and Alpine; May to October.
370. *Neocoelidia lineata* Baker. Alpine and Pine Hills; October.
371. *Neocoelidia obscura* Baker. La Mesa and "The Willows" near Alpine; February to October.
372. *Neocoelidia barretti* Baker. Found on Rhus laurina at Grossmont, Alpine, etc. A very pretty species that has not before been reported from this country.
373. *Cicadula 6-notata* Ball. Common in suitable locations.
374. *Eugnathodus abdominalis* Van D. San Diego, April.
375. *Dicraneura carneola* Stal. Grossmont and Lakeside, April and May.
376 *Dicraneura cockerelli* Gill. San Diego, May 1st, 1913.
377. *Dicraneura unipuncta* Gill. Foster, Mussey's, Alpine.

378. *Dicraneura tricolor* n. sp.

Black; head, pronotum and scutellum red; elytra golden green. Length 2½ mm.

Vertex strongly produced, more so than in *cockerelli,* distinctly longer than the pronotum; convex, polished; front strongly convex. Pronotum conoidal, polished. Elytra subcoriaceous, nervures indistinct. Last ventral segment of the female nearly triangular, the apex almost acutely produced.

Color black; upper portion of the face, vertex, pronotum and scutellum sangineous; elytra golden green, a little tinged with sanguineous on the base of the costa, inner apical areole with a round black point in most individuals and there is generally a slender yellowish median line crossing the vertex, pronotum and scutellum. Wings faintly smoky hyaline.

Described from thirteen examples representing both sexes, taken at Lakeside and Foster in May.

379. *Empoasca smaragdula* Fall. Alpine; June.
380. *Empoasca obtusa* Walsh. San Diego, Mussey's, Cuyamaca Mts.; May to October, on willows.
381. *Empoasca viridescens* Walsh. Abundant of bush sunflowers, etc., throughout the year.
382. *Empoasca aspersa* Gill. & Baker. Alpine, April; Grossmont and Foster, May; La Jolla, July; San Diego, December.
383. *Empoasca alboneura* Gill. Generally distributed here and moderately common.

384. *Empoasca alboscripta* n. sp.

Size and aspect of *alboneura;* elytra with somewhat vermiculate or areolate white markings. Length 3 to 3½ mm.

Vertex rounding, but little produced; about two thirds the length of the pronotum. Elytra subhyaline toward their apex with strong nervures, last ventral segment of the female long, elliptical, subangular and entire at apex.

Color yellowish-green, becoming darker or olive green above but still with a yellow tint. Elytra usually touched with blueish at base of the clavus and washed with the same color near its apex. Vertex with the median line and a spot either side pale. Pronotum with the median line and a spot behind each eye pale. Scutellum with a pair of pale diverging discal lines which are frequently wanting. Elytra when fully colored with the inner nervures and some connecting spots whitish, outlining in an irregular way several elongated green areoles: four on the clavus of which two are basal, one medial and one apical, and a row of three long ones on the inner margin of the corium. Membrane faintly smoky-hyaline with green nervures and a row of whitish spots on either side of the transverse nervures. Wings hyaline, highly iridescent, the nervures white. Beneath touched with blue-green on the clypeus and legs. Margins of the venter stronger yellow, the tergum lined with dark green.

Described from numerous examples taken at San Diego in April and June and at La Jolla in January, the latter, mostly males, were taken on Ceanothus. This may prove to be but a color variety of *alboneura* but it seems sufficiently distinct. Here the nervures are never evenly white, the pale color seems washed on broadly and irregularly giving the insect a mottled appearance. Those taken later in the season were mostly females.

385. *Empoa querci* Fitch. San Diego, May. Differs from eastern examples in having the tergum mostly black.

386. *Empoa querci* var. 6-*notata* n. var.

Differs from typical *querci* in being tinged with yellowish above. The scutellum is fulvus, the elytra have the commissural nervure and a line along the claval suture yellow, and three pairs of fuscous spots along the commissural margin, the first at the tip of the scutellum, the second on the middle of the claval margin and the posterior pair represents the inner end of the usual transverse row, found in *querci* at the base of the apical areoles; the remainder of this row is poorly defined in this variety.

Described from two males taken at Alpine in June. This is quite distinct from var. *bifasciata* of Gillette and Baker.

387. *Empoa tenerrima* H. S. Two examples taken at San Diego in May and June, and one from Alpine, taken in October. I feel some doubt about this determination.

388. *Empoa commissuralis* Stal. San Diego and Cuyamaca Mts., May to October.

389. *Erythroneura obliquua* Say. San Diego, May; Alpine, October. These are pale specimens in which the red is replaced with yellow.

390. *Erythroneura obliquua fumida* Gill. San Diego, May. These also are paler than eastern specimens.

391. *Erythroneura obliquua dorsalis* Gill. Alpine, June 4th, 1913, in two examples the dorsal stripe is blood-red.

392. *Erythroneura comes coloradensis* Gill. Lakeside, May; Alpine, October.

HENRY HEMPHILL, CONCHOLOGIST

IN MEMORIUM—HENRY HEMPHILL.

It is with great sorrow that we have to record the passing away of Mr. Henry Hemphill, a life member of this Society. Mr. Hemphill was born in Wilmington, Deleware, in 1830 and died in Oakland, California, July 24th, 1914, at the age of 84. He came to California about the year 1864 and soon formed an acquaintance with the late R. E. C. Stearns; an acquaintance which ripened into a life long friendship, accentuated by their mutual interest in the study of Mollusks, especially those of the west coast. Mr. Hemphill soon became one of the best authorities in that branch of natural history and material of his collecting is to be found in most of the large museums of the world. Personally Mr. Hemphill was one of the kindest and noblest hearted of men, beloved by all who knew him. His death is a great loss.

Mr. Hemphill was a mason by trade and many of the older San Diego brick buildings are his handiwork. He built for himself a brick house on Third Street, San Diego, where he lived for many years surrounded by his large collection of shells. Finally his daughter prevailed upon him to move to Oakland, California, and live with her and there he spent the last five years of his life. He was a very active man, tireless in the pursuit of his favorite study and only last year, 1913, although eighty-three years of age, he took a vacation trip to the Grand Canyon for pleasure and shell-hunting. In the care of his shells he used arsenic and this poison effected his face causing him great suffering and finally his death.

Mr. Hemphill had a world-wide acquaintance and friendship among those interested in his favorite pursuit and there were few eminent conchologists with whom he was not in correspondence. He was one of the last of the group of naturalists who in the last half of the nineteenth century made the faunal wealth of California so well known.

LIST OF WRITINGS OF HENRY HEMPHILL.

Henry Hemphill—Born 1830—Died 1914. Catalogue land fresh-water and marine shells of California and adjacent states. Leaflet.

——A collector's notes on variation of shells with some new varieties. Zoe vol. I, Jan., 1891. I plate.

——Edible mollusks of Western North America. Zoe II, pp. 134-139, Jy. 1891.

——Studies among mollusks—Instinct and Genera. Zoe II, Jan. 1892.

——Catalogue of North American Shells Collected and for sale by H. Hemphill, July, 1890, 26 pp.

——Haliotis rufescens Swainson. Nautilus, IV, No. 5, p. 59. Sep. 1890.

——Note on Helix yatesi, Zoe, vol. III, Ap. 1892.

——Note on a California Logilo stearnsi, Zoe, Vol. III, Ap. 1892.

——Animals of some West Coast Shells. Zoe III, Jan. 1893.

——Note on Haliotis rufescens Swainson. Nautilus XVI, No. 7, Nov. 1903.

——A second contribution to West Coast Conchology Nautilus vol. XIX, No. 1, May 1905. Nautilus vol. XIX, No. 2, June 1905.

——A new species of Bulimulus Eulimella occidentalus, Zoe vol. IV., March, 1894.

——Note on the Genus Haliotis. Trans. San Diego Society of Natural History, vol. 1, No. 2, 1907.

——Descriptions of some varieties of shells, with short notes on the Geographical range and means of distribution of shells. Trans. San Diego of Nat. Hist. vol. I, No. 3, 1911 pp. 85—113.

OFFICERS

PRESIDENT

General A. W. Vogdes, U. S. A.

VICE-PRESIDENT

F. Stephens

TREASURER

Theo. Fintzelberg

CURATOR AND SECRETARY

Mrs. K. Stephens

BOARD OF DIRECTORS

Prof. E. P. Van Duzee
Prof. Wm. T. Skilling
General A. W. Vogdes, U. S. A.
Theo. Fintzelberg
F. Stephens

JUN 4 1921

2.8.898

JOSEPH C. THOMPSON
SURGEON, U. S. NAVY

The Variation Exhibited by Ancistrodon halys (Pallas) A Pit-Viper Inhabiting the Far East.

TRANS. SAN DIEGO SOCIETY OF NATURAL HISTORY
Vol. 2, No. 2. 1916. Pp. 61-76

JUN 4 1921

THE VARIATION EXHIBITED BY ANCISTRODON HALYS (PALLAS) A PIT-VIPER INHABITING THE FAR EAST

BY

JOSEPH C. THOMPSON

SURGEON, UNITED STATES NAVY

CONTENTS

PAGE

Introduction 61
Variation in Number of Vertebrae 63
Variation in Sum of Gastrosteges and Urosteges 64
Variation in Gastrosteges 64
Variation in Urosteges 65
Variation in Scale Rows 65
Central Asia 69
Ussuri Province 69
Korea 69
China 69
Japan 69
Variation in Physiognomy 70
Variation in Prefrontals 70
Variation in Frontals 70
Variation in Postoculars 71
Variation in Temporals 71
Variation in Supralabials 72
Variation in Infralabials 72
Summary of Variations 73
Position of Viscera 75
Alleged Occurrence in the Loo Choo Islands 75

Introduction.

The foundation of Darwin's theory of Natural Selection rests on the fact that variation occurs among animals and plants of the same species. The underlying cause of this variation is absolutely unknown, it is accepted as one of the attributes of a species.

All species are not equally variable. When a genus contains only a few species which are distinct and not subject to much variation the classification is a simple matter. When on the other hand it contains many species and their range of variation is such that frequently a specimen is found whose proper position in the group is uncertain the correct classification of such a genus may be a difficult task. When an involved genus of this latter type is to be studied it is imperative to obtain large series of specimens from widely separated localities and to submit these to a critical examination noting and recording every variation that may be observed. The most important result from a research of this kind is the additional and detailed information on the subject of variability of species in a state of nature.

When a species is disposed to vary to a considerable degree specimens have often been described by different workers as new to science and given a new name. The literature of Systematic Herpetology contains endless errors of this kind. Those made in the last two decades are almost entirely due to a faulty appreciation on the part of mere systematists of the extent to which some forms may vary.

From this it follows that one of the sequels to a study in variation will often be a contribution to synonymy for it will be found that specimens have been described as new that are only variations. When two specimens vary one from the other yet are connected by intermediate examples it demonstrates that they all belong to the same species and therefore these variations in no wise merit specific recognition in the nomenclature.

Were the question of nomenclature purely academic further reference to the subject would be unnecessary, but this assigning of names to each trivial variation and the retaining of these names has two pernicious effects: first, it thwarts and obscures research along the line of variation, and secondly, it impedes the study of the distribution of animals and plants.

The primary object of this contribution is to call attention to the variation which may be exhibited by a single species of serpent.

The data upon which the study of *Ancistrodon halys* (Pallas) is based have been derived from over two hundred specimens; nearly one-half of these have been examined and the records of the remainder compiled from literature.

This species is of considerable interest, for with the exception of *Vipera berus* (Linnæus) 1766, it has a wider distribution than any other Solenoglyph. In fact, in this respect it is equaled by few members of the entire sub-order Serpentes. In general terms it is distributed from the Caspian Sea to Japan, and from Lake Baikal to the Kuen Lung System of Mountains. Definite localities on the outskirts of this area are: to the north, the Yenisei Valley and the Amur Valley; to the east, the Tschargan River and the Talysch District of the Transcaucasus; to the south, the Elburz Mountains, Lob Nor, and the Nan-shan Mountains, and to the west, the Ussuri Province, Japan, and Chekiang Province. The literature contains a few records of specimens from localities beyond this region (1) which are not sufficiently confirmed to be included at the present.

Associated with this wide distribution there occurs a large range of variation. These two factors have been responsible for the several supposed species that have been described in the past and maintained up to the present time. The series of specimens available for study has lead to the conclusion that the synonymy of *Ancistrodon halys* (Pallas) 1776, should include the following:

Ancistrodon blomhoffii Boie 1826, Japan.

Agkistrodon blomhoffii brevicaudus Stejneger 1907 Fusan.

Ancistrodon affinis Gray 1849, type locality unknown.

Ancistrodon intermedius Strauch 1868, Irkutsk.

The prohibitive difficulty of maintaining these as distinct species is due to the fact that when a real museum series

(1) Loo Choo: 1896, Boulenger, Cat. Sn. Brit. Mus. III, p. 526, (A. blomhoffii). 1907, Stejneger, U. S. N. M. Bull. 58, p. 461, (A. blomhoffii affinis.) Formosa; 1863, Swinhoe, Ann. Mag. Nat. Hist. (3), XII, p. 225, (Halys blomhoffii). Hainan: 1866, Bocourt, Nouv. Arch. Mus. Paris, II, Bull. p. 9, (Trigonocephalus blomhoffii).

Since these accounts have been published over three thousand reptiles and amphibians have been added to museum collections from these localities without additional specimens of this form having been taken.

is gone over it is regularly found to contain many specimens which are impossible to determine according to the definitions given. The average of a set of examples from Central Asia and Eastern Asia, or from China and Japan, differs sufficiently to have justified the earlier authors in establishing the several species, but, the number of specimens found with intermediate characters absolutely precludes the possibility of retaining these names as indicating valid species.

In reviewing the literature one may read in the volume by Strauch, "So halt es nicht ganz leicht, ein Merkmal zu finden, durch welches sie fur alle Falle mit Sicherheit von einander zu unterscheiden waren." (1). Boulenger in speaking of *A. intermedius* states that it "Agrees in most respects with *A. halys*, but the snout is not at all turned up at the end, as in *A. blomhoffii*"; and *A. blomhoffii* he mentions as "Closely allied to *A. halys*, with which it agrees in most respects, but the snout not turned up at the end, and scales more strongly keeled" (2). Professor Leonhard Stejneger writes: "It will be seen that a considerable amount of intergradation occurs. Thus it would be impossible to say to which of the three forms (Tables II, III, or IV) a specimen with 151 ventral and 45 subcaudals were to be referred unless it had 8 supralabials, * (3). From this it may be inferred that these authors have felt the inherent difficulty of separating these forms.

When it is admitted that one form agrees in most respects with another, that it is difficult to find a character that will separate them, and that considerable intergradation occurs, the probability is that but one valid species is under consideration. It is also fairly certain that further collecting along the zones of contact of the two supposed forms will bring to light many specimens with the intermediate characters necessary to cement the two groups into a single species that henceforth will be of increased interest owing to its range of variation. This, it is believed, is the status of *Ancistrodon halys*.

Variation In Number Of Vertebrae.

There are many members of the sub-order Serpentes that show a vastly greater variation in the number of verterbræ than do any of the other animals in the entire Phylum of Vertebrata. An extreme example of this nature is the Marine Serpent *Distira fasciata* (Schneider) 1799, the number of

(1) 1873 Strauch, Schl. Russ. R. p. 235.
(2) 1896 Boulenger Cat. Sn. Brit. Mus. III, pp. 525-526.
(3) 1907 Stejneger, Bull. No. 58, U. S. N. M. p. 452.

whose body vertebræ alone may vary as much as one hundred.

When investigating this character one should record the number of body and caudal vertebræ separately and obtain their sum.

Variation In Sum Of Gastrosteges And Urosteges

The number of verterbræ in terms of gastrosteges and urosteges is subject to a fairly wide range, being from 170 to 226, a difference of 56. Specimens from Siberia possess the highest, those from the Yangtse Valley the lowest, and those from Korea and Japan the intermediate counts.

	Examples.	Minimum.	Maximum.	Average.
Range of variation	152	170	226	190
Range in Mainland specimens	109	170	226	193
Central Siberia	29	195	226	214
Eastern Siberia	27	191	202	195
Korea	24	175	200	187
China	29	170	185	178
Range in Island specimens	43	179	200	187
Hokkaido	6	183	195	188
Hondo	23	179	200	191
Shikoku	2	187	187	187
Hachijoshima	2	185	185	185
Awaji	1	190	190	190
Kiushu	1	184	184	184
Ikishima	5	182	188	185
Tsushima	3	182	192	188

The range of variation in the mainland examples being from 170 to 226 and of the Island examples from 179 to 200, it is evident that the range of the mainland specimens widely overlaps that of the island specimens.

Variation In Gastrosteges.

Every effort should be made to have the gastrostege count an index to the number of the dorsal vertebræ. To further this aim it is necessary to ascertain which shield corresponds with the first link in the vertebral column. A few dissections have shown the most approximate estimate that can be made without actually opening the neck is to reckon as the first gastrostege the first shield that is of the same width as the entire series; it is usually further characterized by being colored like the rest of the gastrosteges and not white as are the throat shields.

The shields between the anterior pair of geneials and the first gastrostege are referred to as gulars; they are of two types, paired and azygos. Note should be made of their number in the record of each specimen, as this will tend to fix the first gastrostege, this being the shield from which are started many of the counts.

If the locality of each specimen be plotted on squared paper, due regard being taken of the gastrostege and urostege

count, a diagram results that will materially aid in presenting the facts. (Vide appendix).

It may be seen at a glance that the number of gastrosteges varies from 132 to 179, thus indicating a difference of 47 somatic vertebræ. Further inspection evidences that the specimens from the islands have the shortest bodies. If these are compared with specimens from Central Asia the opposite extreme of the distribution it is seen that they do not overlap in respect to this character, the gap of one vertebra existing at the numbers 146-147. However, in the immediate vicinity of this discrepancy there are ample records from the intervening mainland, that is the Ussuri Province and Korea. It is clear that the affinities of the Japanese specimens are to be found among those from China. The final point to be derived from this diagram is the fact that no lines of demarkation or grouping of the specimens exist. Such lines would necessarily be found were we dealing with distinct species, while their absence is proof that but one species is under consideration.

Variation In Urosteges.

The urosteges exhibit a wider range of variation proportionately than the gastrosteges, the count being from 30 to 58, a difference of 28 caudal vertebræ.

	Examples.	Minimum.	Maximum.
Total Range	182	30	58
Mainland Specimens	138	30	53
Central Asia	58	32	53
Eastern Siberia	27	36	51
Korea	24	31	52
Yangtse Valley	29	30	43
Island Specimens	44	41	58
Hokkaido	6	41	52
Hondo	24	45	58
Hachijoshima	2	46	46
Awaji	1	50	50
Shikoku	2	45	47
Kiushu	1	48	48
Ikishima	5	41	50
Tsushima	3	44	46

It occasionally happens that a few of the urosteges are entire. These undivided shields are regularly found close to the base of the tail.

	Examples.	Normal	With a few entire Shields.
Total Number	61	51	10
Ussuri Province	3	2	1
Korea	20	17	3
Shanghai	20	16	4
Japan	18	16	2

Variation In Scale Rows.

Over fifty specimens have been studied for this character. They include material from seventeen localities in the eastern

region of the distribution. There is a wide range in the maximum number of scale rows around the anterior part of the body. The normal is 21; it may be increased to 23 and to 25, or it may be decreased to 19 rows. We have been taught by Doctor Ruthven that for the purpose of comparing one set of observations with another the scale rows must be given permanent numbers, also, that it is necessary to select a specimen having the maximum number of rows for the species. In this case it is one with 25 rows, and these are numbered I to XII, counting from the outer row inward to the median. In all specimens the maximum count is on the anterior part of the body and diminishes posteriorly. This decrease is due to the loss of definite scale rows, exactly as Doctor Ruthven has shown occurs in the genus *Thamnophis* (Fitzinger) 1843.

In *Ancistrodon halys*, the sequence of suppression is as follows:

25 rows, V row suppressed, leaving—
23 " VI " " "
21 " IV " " "
19 " VII " " "
17 " , which are continued to the vent.

The normal squamation is where there are 25 rows anteriorly with the V row suppressed leaving 23 rows; next the VI row is suppressed leaving 21 rows; then the IV row is suppressed leaving 19 rows; finally the VII row is suppressed, leaving 17 rows which are continued without further loss to the base of the tail. The scale formula for this type would be written:

25-23-21-19-17 (-V-VI-IV-VII).

In a normal specimen the number of scale rows, the sequence of suppression, and the gastrostege level on the right and left sides of the body at which the rows terminate, may be thus expressed:

Museum	Locality	Sex.	G.	25-V.	23-VI.	21-IV.	19-VII.	17-Cont.
U. S. N. M. 34024	Yokohama	♂	141	7 8	14 14	101 103	136 130	....

In specimens with the same number of scale rows there is a difference in the distance to which the suppressed rows extend down the body. From this have resulted the different accounts that are found in literature of the number of scale rows around the body. There are records of specimens with 25, 23, 21, and 19 rows. It is evident that a specimen with 25 rows anteriorly, and the V row continuing down the body to the level of the 80th gastrostege would be recorded as

having 25 rows, whereas one with 25 rows anteriorly and the V row terminating well forward at the level of the 10th gastrostege would be recorded as having 23 rows. Another specimen with 25 rows anteriorly in which both the V and VI rows terminate a little behind the neck would be recorded as having 21 rows.

The point involved may be illustrated by the detailed scale formulæ of two specimens in the United States National Museum. These are mentioned in the Herpetology of Japan by Professor Leonhard Stejneger, the male as having 23, and the female 21 scale rows.

Museum No...	Sex.	Rows.	25-V.	23-VI.	21-IV.	19-VII.	17-Continued.
34040	♀	23	17-12	70-79	103-102	Continued.	
34024	♂	21	7-8	14-14	101-103	136-130	Continued.

The scale rows may further vary, not only in the maximum number that occurs anteriorly, but also in the minimum count that is found towards the base of the tail. This variation combined with the difference in the level to which a suppressed row extends down the body, gives rise to two types of scale formulæ:

25-23-21-19-17 (-V-VI-IV-VII)
25-23-21-19 (-V-VI-IV)

Detailed records of a few specimens possessing these different types may now be reviewed.

Formula 25-23-21-19-17 (-V-VI-IV-VI).

Museum.	Locality.	Sex.	G.	25-V.	23-VI.	21-IV.	19-VII.	17-Cont.
Cal. Ac Sci. 31511	Korea	♂	148	14-20	98-90	107-107	140-134	....
U. S. N. M. 34024	Hondo	♂	141	7-8	14-14	101-103	136-130	....
Cal. Ac Sci. 26732	Hokkaido	♂	136	6-5	11-11	106-110	132-132	....
Cal. Ac Sci. 26142	Ikishima	♂	138	9-9	15-12	78-78	109-110	....
Cal. Ac Sci. 14615	Shanghai	♀	145	9-9	56-47	108-106	124-125	....

Formula 25-23-21-19 (-V-VI-IV).

Museum.	Locality.	Sex.	G.	25-V.	23-VI.	21-IV.	19-Continued.
U. S. N. M. 21866..	Shikoku	♀	137	9-9	68-67	111-114	....
U. S. N. M.	Shikoku	♀	140	7-7	12-12	114-109	....
Cal. Ac. Sci. 16096.	Hondo	♀	142	5-5	9-8	101-103	....
U. S. N. M. 23436..	Hokkaido	♀	139	9-7	14-15	116-116	....
Cal. Ac. Sci. 26141.	Ikishima	♀	140	13-14	72-70	102-102	....

Formula 23-21-19 (-VI-IV).

There are two specimens in the Vladivostok Museum. Nos. 515 and 522, from the Ussuri Province with this formula. The 19 row zone begins at the level of the 10th gastrostege. These are the only specimens recorded with this reduced

number of scale rows about the anterior part of the body.

On the mainland the prevailing formula is 25-23-21-19-17, being present in about 66 per cent of the specimens. In the islands the majority have the count of 25-23-21-19, occurring in about 80 per cent. These differences show that in the island specimens, associated with the shorter body, there is a tendency for the VII row to be continued and for the zone of 19 rows to remain intact to the base of the tail.

These counts do not indicate such a radical difference as is so often the case between valid species. They merely indicate a difference in the distance down the body that these suppressed scale rows extend.

Neither the number of scale rows, nor the distance to which they extend down the body, in any way effects the sequence of suppression; this, barring abnormal individuals, is definitely fixed for each species. Several hundred species have been investigated for this character, which when better known will prove of high value in confirming or establishing relations between genera.

The greatest range of variation that is known in the number of dorsal scale rows in a single species is found in *Thamnophis ordinoides* (Baird and Girard) 1853. (1)

There being recorded ten distinct formulæ:

21-23-21-19-17
21-19-17
19-21-19-17
19-21-19-17-15
19-17
19-17-15
19-17-15-13
17-19-17-15
17-15
15-17-15

In this Garter-Snake from the Pacific Coast of North America the sequence of suppression is (-V-VI-IV-VII). It is a matter of much interest to note that this sequence is the same as that found in *Ancistrodon halys*. In these two species there must be some analogous underlying cause that brings about a reduction in the number of scale rows around the body by an identical sequence of suppression.

(1) 1914, Thompson, Proc. U. S. Nat. Mus. Vol. 47, p. 351.

Central Asia.

The data for this table has been compiled from the Snakes of the Russian Empire by Strauch, the Catalogue of the Snakes in the British Museum by Boulenger, and the Herpetology of Japan by Professor Leonhard Stejneger.

		Per cent.
Total Number of Specimens	50	
25 Scale Rows	2	4
23 " "	42	84
21 " "	6	12
19 " "	0	0

In comparing this table with those that follow it will be noted that the serpents from Central Asia have the highest scale row count, the normal being 23 rows, furthermore it is only from this region that specimens with 25 rows have been reported.

Eastern Siberia.

The Khingan Range of Mountains is regarded as the boundary between Central and Eastern Siberia. The records in literature, notes on eleven specimens in the Vladivostock Museum, and two collected in 1907 afford the following table:

		Per cent.
Total Number of Specimens	30	
25 Scale Rows	0	0
23 " "	20	66 2-3
21 " "	8	26 2-3
19 " "	2	6 2-3

Korea.

The records in literature, and notes from a few other specimens are combined in the following table:

		Per cent.
Total Number of Specimens	25	
25 Scale Rows	0	0
23 " "	5	20
21 " "	20	80
19 " "	0	0

China.

The records in the Catalogue of Snakes in the British Museum and notes from twenty examples collected at Shanghai compose the following table:

		Per cent.
Total Number of Specimens	29	
25 Scale Rows	0	0
23 " "	3	10 1-3
21 " "	26	89 2-3
19 " "	0	0

Japan.

There are available in literature and from a few field notes the following records of the maximum number of scale rows around the anterior half of the body:

		Per cent.
Total Number of Specimens	46	
25 Scale Rows	0	0
23 " "	8	17 1-2
21 " "	38	82 1-2
19 " "	0	0

The two types are distributed among the different islands as follows:

Islands.	23 Rows.	21 Rows.
Hokkaido	0	6
Hondo	2	22
Hachijoshima	0	0
Awaji	0	1
Shikoku	1	1
Kiushu	0	1
Yakushima (1)	1	0
Tanegashima (1)	1	0
Ikishima	3	2
Tsushima	0	3
Total	8	38

Variation In Physiognomy.

There are marked differences in the profile and contour of the head of certain specimens. The snout may be short and decidedly tilted at the tip. This is very striking but is not associated with any other constant character. Specimens with the turned-up snout have even been captured in the same thicket with the commoner variety having the flat head. The other character, the contour of the muzzle, varies in being more acute in some specimens than in others. With just a few specimens at hand it would not be unreasonable to assert that two distinct species were under consideration. But, after examining a large series and finding every combination of these characters one is convinced of the specific identify of the snakes. From this it appears that not only may a single species of serpent vary in details of squamation, but also structurally to the extent of producing a marked difference in its external anatomy.

Structural variation in the size of the eye is known to exist among specimens of *Thamnophis parietalis* (Say) 1823, taken in California. The extremes are astonishingly wide apart, yet a perfect series of intermediate diameters may be found.

Variation In Prefrontals.

There is considerable variation in the shape of these shields. They vary from being as long as wide to a shorter condition in which the length is but 2-3 of the width. The specimens with the shorter shields have the shorter and broader snout. Two percent of the examples studied showed the tendency to fragmentation of this shield.

Variation In Frontal.

In the majority of specimens from Shanghai the frontal shield is about 1 2-5 times longer than broad. In all the

(1) 1903, Wall, Proc. Zool. Soc. London, p. 102.

Japanese examples the proportion is less than 1 1-5. In those from Korea there occurs about an equal number of the narrow and broad shapes. These variations in the shape and length of the prefrontal and frontal shields are seen in specimens that have a decidedly different physiogonomy.

Variation In Postoculars.

The only variation these shields offer is where the normal number of two is increased to three. This is regularly brought about by a division of the upper part of the normal inferior postocular. Occasionally this shield is merely dented at the line where the separation occurs.

	Examples.	Normal. 2	Asymmetrical. 2-3	Increased. 3
Total Number	76	66	7	3
Ussuri Province	2	2	.	.
Korea	25	16	7	2
Shanghai	20	19	0	1
Japan	29	29	.	.

It will be noted that the specimens from the mainland are the only ones to show this variation.

Variation In Temporals.

The region between the large smooth temporal shields and the parietals is covered with a set of small scale-like shields that are frequently keeled. These may be referred to as supratemporals. The anterior of these lies just behind the superior postocular. It is normally single; the only variation is where it is double, the additional shield being formed by an horizontal division.

	Examples.	Normal. 1	Asymmetrical. 1-2	Increased. 2
Total Number	60	49	6	5
Ussuri Province	2	11	.	.
Korea	20	15	3	2
Shanghai	20	19	1	.
Japan	18	14	2	2

Occasionally the anterior temporal shield is fragmented, the anterior inferior angle being separated by a suture. In a few cases the middle temporal shield was horizontally divided. The posterior temporal is subject to much variation in size and shape.

The middle temporal shield is usually not as deep as the anterior, but in many specimens the vertical diameters of the two shields are equal.

		Middle Temporal Shield.	
	Examples.	Lower than Anterior.	Equal to Anterior.
Total Number	60	46	14
Ussuri Province	2	2	.
Korea	20	12	8
Shanghai	20	14	6
Japan	18	18	.

Variation In Supralabials.

The normal condition is to have 7 supralabials with the III entering the eye. When the number is increased to 8 it is due to the normal V shield being divided. When the count is decreased to 6 it is not known what shields are fused or suppressed to bring it about.

	Examples.	Normal. 7	Asymmetrical. 7-8	Bilateral. 8
Total Number	118	97	13	8
Central Asia	10	2	3	5
Ussuri Province	13	7	4	2
Korea	25	21	3	1
China	29	27	2	.
Japan	41	40	1	.

It is evident that in specimens from the mainland along with their larger size there is an increase in the number of scale rows around the anterior half of the body and a tendency for an increase in the number of supralabial shields.

Variation In Infralabials.

The normal condition is to have 10 infralabial shields. Where the number is increased to 11 it is due to the normal VII shield being divided. Where the count is decreased it is usually due to the fusion of the normal II and III shields, but may be brought about by the fusion of the I and II, or the VII and VIII shields.

	Examples.	Increased. 11	Asymmetrical. 11-10	Normal. 10	Asymmetrical. 10-9	Decreased. 9
Total Number	59	5	16	31	4	3
Ussuri Province	2	.	.	1	1	.
Korea	19	2	5	7	2	3
China	20	2	3	15	.	.
Japan	18	1	8	8	1	.

It may be instructive to compare the count of the labial shields in *Hebius vibakari* (Boie) 1826, (1) which occurs in the Ussuri Province, Korea, and Japan.

The supralabial shields are normally 7, with the third and fourth entering the eye. When the number is increased to 8, it is by the addition of a shield between the normal II and III, and is referred to as IIa; in actual counting the fourth and fifth enter the eye. When the number is decreased to 6, it is due to the fusion of the normal III and IV shields; by actual count it is the third that enters the eye.

(1) 1913, Thompson, Proc. Zool. Soc., Loudan II, p. 424.

These variations may be represented in this manner:

I	II	III	IV	V	VI	VII	Normal, 7.
I	II | IIa	III	IV	V	VI	VII	Increased, 8; IIa added.
I	II	III & IV		V	VI	VII	Decreased, 6; III-IV fused.

The frequency of these variations in terms of percentage is as follows:

Supralabials.	Mainland, 9 sp.	Island, 30 sp.
5-6	11.1	....
6	11.1	....
6-7	11.1	....
7	66.6	76.6
7-8	....	16.6
8	....	6.6

The infralabial shields are normally 8. When the number is increased to 9, it is by the addition of a shield between the normal VII and VIII; this added shield is referred to as VIIa.

I	II	III	IV	V	VI	VII	VIII	Normal, 8.
I	II	III	IV	V	VI	VII | VIIa	VIII	Increased, 9; VIIa added.

Infralabials.	Mainland, 4 sp.	Island, 9 sp.
8	100 per cent	44.4
8-9	....	44.4
9	....	11.1

In this species when a change from the normal occurs it is brought about by the addition or loss of different shields than is the case in the genus *Thamnophis*, (Fitzinger) (1).

Supralabials.	Trop. vabakari.	Thamnophis.
7 increased to 8	IIa added.	IIa added
7 decreased to 6	III-IV fused	VI suppressed
Infralabials.		
8 increased to 9	VIIa added.	IIIa added.

Summary Of Variation.

The tabulated summary again emphasises the affinity between the Japanese and Chinese rather than between the Japanese and the Korean specimens. There is a fairly well marked line of demarkation between the Reptile and Batrachian Faunas of Korea and Japan. This line runs parallel with the Korean Strait, passing to the east of Quelpart and Tsushima Islands.

(1) 1908, Ruthven Bulletin No. 61, U. S. National Museum, p. 23.

The affinity between the Chinese and the Japanese specimens may be correlated with the past geology of the region.

Suess has shown that the mountain range in the lower limb of the Japanese Island arc bends sharply to the west and in former periods it was continuous with the Tsin-Lin Mountains in Central China. It will be remembered that near these Chinese Mountains and in the lower limb of the Japanese arc are the only localities in which is found *Megalobatrachus japonicus* Schlegel, the giant salamander of the Far East.

TABULATED SUMMARY. (1)

	Scale Rows				Postoculars			Supratemporals			Supralabials				Infralabials			
Locality	25	23	21	19	2	2-3	3	1	1-2	2	7	7-8	8	11	11-10	10	10-9	9
Central Asia	4	84	12	..	?	?	?	?	?	?	20	30	50	?	?	?	?	?
Eastern Siberia .	..	66	26	6	100	...	..	100	...	..	54	31	15	..	..	..	50	50	..
Korea	..	20	80	..	64	28	8	75	15	10	84	12	4	10	26	37	10	16
China	..	10	90	..	95	..	5	95	5	..	93	7	..	10	15	75	....	..
Japan	..	17	83	..	100	...	..	78	11	11	97	3	..	5	44	44	5	..

In reviewing this table it appears there is not the slightest tendency for these variations to be grouped, or for one independent set to be associated with another. It is not even possible to correlate them with a given distribution. On the other hand it is not to be inferred that they occur entirely at random. Each series of specimens from a definite region has its own average in respect to a given character, and this average may differ when compared with figures derived from a set of specimens captured in another region. The final deduction is that these variations cannot any longer be employed to establish and maintain valid species; that is, species that will conform to the immortal definition given by Gunther in the Preface to Volume VIII of the Catalogue of the Fishes in the British Museum. This reads: *"I consider a species to be well established only when it is founded on characters which, from an examination of numerous examples are found to be permanent, not subject to gradual variation, and not dependent on season, sex, or age—or which are known to be so from the examination of allied forms."*

(1) To facilitate comparison the entries are in terms of percentage of the total number of specimens from each locality.

Position Of The Viscera.

The external landmarks of the principal viscera, in terms of gastrosteges are as follows:

Sex	♂	♂	♂	♂	♀	♂	♀	♂	♀
Scale rows	25-17	25-19	25-19	25-17	25-17	25-19	25-15	25-17	25-17
Gastrosteges	134	140	140	139	139	143	143	154	153
Heart apex	47	47	41	45	46	47	45	52	49
Liver, tip	47	51	45	47	50	50	44	53	52
Liver, end	75	78	83	81	79	82	78	83	85
Gall bladder	83	88	90	86	87	93	89	96	99
Kidney, right, tip..	105	111	112	110	112	107	122	119	127
Kidney, right, end.	123	127	123	129	130	134	134	144	147
Kidney, left, tip..	107	114	115	114	115	115	124	122	129
Kidney, left end..	125	130	132	131	130	135	135	143	144
Cal. Ac. Sci., Museum No.....	26732	16097	14611	14621	14609	31538	31507	31540	31542

In this species there is no definite relation between the level at which the scale rows are suppressed and the underlying viscera. The body begins to taper noticeably posterior to the liver and in the majority of specimens the last two rows to be suppressed terminate between the level of the gall bladder and the tip of the right kidney.

The sex of the specimen to a marked degree influences the position of the viscera. In the male the heart is a trifle further caudad, there is a wider space between the heart and the liver, the anterior kidney is longer and there is much less space between this organ and the liver. It will be seen that in the female the differences tend to afford more space in the abdominal cavity for carrying the young.

Alleged Occurrence In The Loo Choo Islands.

The presence of this serpent in the Loo Choo Group is open to a just suspicion. The type specimen of *Trigonocephalus affinis* (Gray) 1849, British Museum "x," is without a locality label. It in no respect differs from those found in Japan. British Museum specimen "d", reported from Okinawa, is also typical of the Japanese average. The two specimens recorded from Yae Yama, United States National Museum Nos. 34038 and 34039 likewise differ in but one slight abnormality from typical Japanese examples. The color of both, and especially No. 34039, is nearly ruined by exposure to strong light; each specimen is slightly darker on the inner and less exposed sides of the coils as they repose in a jar.

Details of the scale formulæ of the two specimens are as follows:

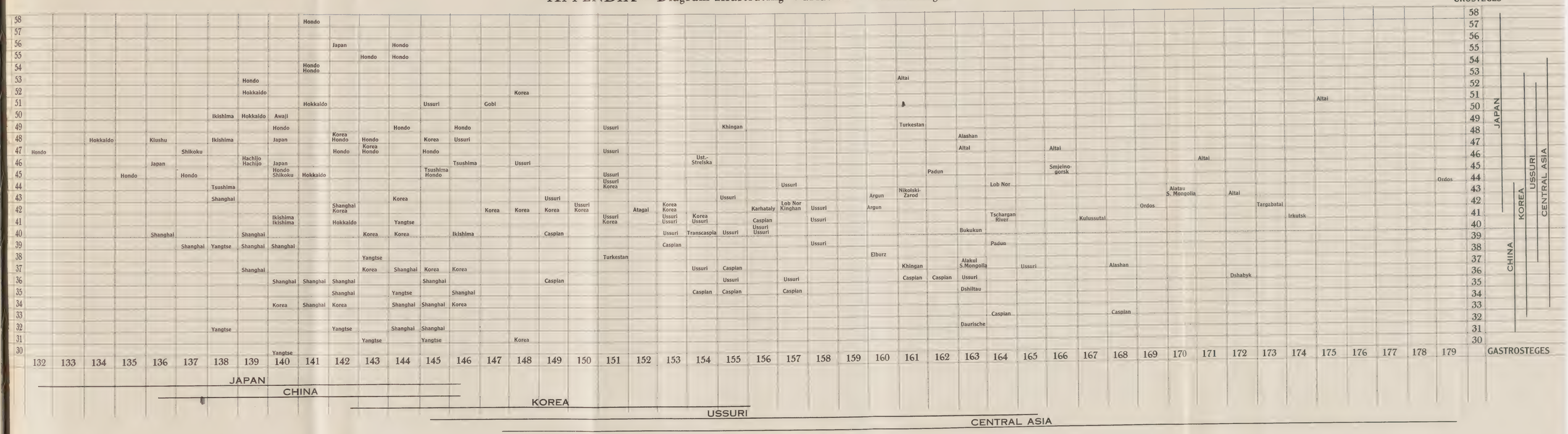
U. S. N. M.	Sex.	G.	25-V	23-VI	21-IV	19-VII	17-Continued
34038	♂	138	5 5	7 7	91 91	117 121	....
34039	♂	137	3 8	6 8	76 82	119 123	....

It will be noted that this formula 25-23-21-19-17, predominates in island specimens to the north of Yokohama, while the 25-23-21-19 type is the prevailing one in Southern Japan.

The occurrence of the few faded specimens in collections from the Loo Choo Islands may readily be accounted for if the gastromomic use to which they are put is taken into consideration. There is an oriental proverb to the effect that what cannot be eaten may still be made into medicine. The peasants of China credit this serpent with valuable therapeutic properties, and it has even been seen for sale in the Chinatown of San Francisco. Among the Japanese it is extensively used as an alterative, especially by the young men in the spring time. It is to be seen dried or preserved in sake, the national wine, on the counter of any chemist shop, especially inland and away from the Treaty Ports. It is therefore logical to assume that these specimens were invoiced to the Loo Choo Islands as a part of a consignment of drugs, and subsequently were gathered in by a native collector. Furthermore, there are over two thousand specimens of Reptiles and Batrachians from the Loo Choo Islands in museums; these are known to include fifteen species of serpents, all of which with one exception are strictly endemic. This exception is *Typhlops braminus* (Daudin) 1803, an archaic form and distinguished by having the widest distribution of any of the Typhlophidae, it being found from Persia in the west to Guam in the east.

U. S. NAVY RECRUITING STATION
SAN DIEGO, CALIFORNIA, May 26, 1916

APPENDIX---Diagram Illustrating Variation in Gastrosteges


UROSTEGES
GASTROSTEGES
JAPAN
CHINA
KOREA
USSURI
CENTRAL ASIA
Hondo
Hokkaido
Kiushu
Shikoku
Japan
Hondo
Ikishima
Tsushima
Shanghai
Hokkaido
Hondo
Awaji
Hachijo
Hachijo
Hondo
Shikoku
Ikishima
Shanghai
Yangtse
Shanghai
Hondo
Japan
Hokkaido
Hondo
Hondo
Hondo
Japan
Hondo
Hondo
Korea
Korea
Hondo
Hondo
Korea
Shanghai
Hokkaido
Shanghai
Korea
Yangtse
Shanghai
Korea
Shanghai
Yangtse
Hondo
Hondo
Korea
Ussuri
Hokkaido
Ussuri
Hondo
Korea
Ussuri
Hondo
Tsushima
Hondo
Korea
Korea
Shanghai
Korea
Shanghai
Korea
Shanghai
Korea
Korea
Gobi
Korea
Ust.-Strelska
Tsushima
Ussuri
Korea
Korea
Ussuri
Korea
Ussuri
Korea
Korea
Ussuri
Korea
Ussuri
Ussuri
Ussuri

OFFICERS

OF THE

San Diego Society of Natural History

1916

President - - - GEN. A. W. VOGDES, U. S. A.
Vice President - - - MR. F. STEPHENS
Secretary - - - MRS. H. RICKSECKER

BOARD OF DIRECTORS

GEN. A. W. VOGDES, U. S. A.
MR. F. STEPHENS MRS. H. RICKSECKER
MR. W. W. WHITNEY MR. W. F. SKILLING

Incorporated 1874

Reprints. For those contributors who wish to obtain reprints of their papers, an arrangement has been made by which they may be supplied in accordance with the author's wishes. Additional reprints will be furnished at approximately the rate given in the table below, but the order must be made with the return of proof, in advance of publication.

Copies	2 pp.	4 pp.	8 pp.	12 pp.	16 pp.	20 pp.
50	$1.00	$1.50	$2.00	$2.25	$2.75	$4.00
100	1 25	2.00	2.50	3.25	4.00	5.50
200	1.75	2.50	3.50	4.50	5.50	7.25

The price of covers, with title printed thereon, will be, for the first fifty $1.75; for each additional hundred, $1.25.

PRESS OF
COMMERCIAL PRINT SHOP
SAN DIEGO, CALIF.

JUN 4 1921

28.898

EXCURSION IMPRESSIONS

TRANSACTIONS SAN DIEGO SOCIETY OF NATURAL HISTORY
Vol. 2, No. 3. 1916. Pp. 77

JUN 4 1921

Excursion Impressions

By Frank Stephens

The Pacific Division of the American Association for the Advancement of Science held its annual meeting in San Diego, California, August ninth to twelfth, 1916. Among the excursions offered visiting members and their friends was one arranged by the San Diego Society of Natural History and the Scripps Foundation to the border of the Colorado Desert, a two-day trip by automobile. Its object was to afford visitors an opportunity to see the changes in the plant life from the sea coast to the arid region east of the mountains. The trip was too hurried for any detailed work, and as it was the height of the dry season most of the annual plants were ripe and dry.

Going out the usual stage route to Imperial was followed. The return was over the same route as far as Campo, where we turned northward to Pine Valley and Descanso and to San Diego, by a route north of the one followed going out. The length of the round trip was about 220 miles. The accompanying sketch map will give the details of the route followed.

The start from San Diego was made at 8 a. m., August 13th, with thirty-two members and their friends in six automobiles. Lunch was eaten under the oaks near Campo. In the afternoon the party went to the edge of the Colorado Desert, and returned at dusk to the crest of the precipitous eastern slope of the mountains, where camp was made under the stars, as in this sparsely settled region there was not sufficient hotel accommodations for so large a party. Blankets and provisions for the party were taken along in an auto-truck. The weather was cool for the season, and, except a rather strong breeze during the night, it was very pleasant. The thermometer at camp was 76° at sunset and 65° at sunrise. At noon of the 14th, lunch was eaten under the pines in Pine Valley, and the party returned to San Diego before sunset.

The principal interest of the trip was botanical. It was the wrong season to find many plants in flower, but quite a number of shrubs and perennial plants were in bloom. Butterflies and other insects were scarce. Few birds and mammals were seen, partly because of the disturbance made by the autos. Dr. Grinnell and I put out seventy-five small traps at the night camp and caught eighteen small rodents, of five species. But one geologist was with the party.

I asked several members of the party to write their impressions of what they saw on the trip, and their accounts follow. It is interesting to have accounts of the same trip from different view points.

The approximate altitudes of places on the route followed are: Lemon Grove, 500 feet; Jamul, 1000; Dulzura, 1100; Cottonwood Creek, at the crossing, 875; Mt. Tecate, 3900; Potrero, 2300; Campo, 2550; Peninsular divide, 4000; Jacumba, 2900; our night camp, 3400; edge of the Colorado Desert, 1000; Pine Valley, 3700; Descanso, 3500; Cuyamaca Peak, 6500; Alpine, 1900; El Cajon, 500.

By Dr. Forrest Shreve.

The Desert Laboratory, Tucson, Arizona.

A rapid journey made through an interesting stretch of country awakens a constant desire to stop, linger and examine the natural phenomena in greater detail. It is often extremely vexing to feel it necessary to push forward under these circumstances, but in the very rapidity of such a trip there is a value which it is impossible to overlook. A rapid journey through a diversified region keeps the observer from being overwhelmed with new details and leaves his mind free to receive the larger impressions. In the excursion made by members of the Western Society of Naturalists and the Ecological Society of America, under the auspices of the San Diego Society of Natural History, there was opportunity for a considerable examination of details at the same time that the journey of 200 miles, covered in two days, was sufficiently rapid to give the participants a vivid series of pictures of very dissimilar regions. To leave the humid Pacific shores in the morning and to witness the sunset on the arid sands of the Colorado desert on the same day is an experience which can not fail to linger in the recollections of all who have enjoyed it.

The course of the excursion lay east from San Diego, through the complex and crowded foothills to Campo, then through a series of valleys lying between 3500 and 4000 feet, to a rather abrupt edge, from which it was possible to overlook the Imperial Valley. From this place the route descended rapidly to the edge of the desert, at about 1000 feet. In the vicinity of San Diego much of the country has been altered by cultivation, but the greater part of the journey lay through virgin country.

From San Diego to the drainage divide of the Cuyamaca Mountains, east of Campo, the prevailing vegetation is chaparral, in which *Adenostoma fasciculatum* is the predominant plant. This type of vegetation, so characteristic of Southern California, here reaches a height of about 5 to 6 feet, forming dense thickets in some places and low or open stands in others. Among the commonest associated plants are *Rhus integrifolia, Eriodictyon crassifolium* (yerba santa), *Audibertia polystachya* (white sage), and *Eriogonum fasciculatum*. In the flood-plains of the larger streams are to be seen large trees of *Quercus chrysolepis* and *Platanus racemosa*, together with species of *Sambucus, Salix, Populus* and the climbing *Vitis girdiana*. The narrow dales, or valleys devoid of streamways, appear to have been originally unoccupied by either trees or chaparral, although it is now difficult to be sure of such a matter.

There is little change in the character of the chaparral until an

elevation of 1500 feet is reached. Up to this point the hills show frequent breaks in the continuity of their cover, and large groups of *Opuntia littoralis* are common, as well as the less conspicuous cylindropuntia, *O. prolifera.* Above 1500 feet the chaparral is practically unbroken, and the number of species growing with *Adenostoma* is increased by the addition of *Rhus ovata, Quercus dumosa, Ceanothus tomentosus* and *C. eglandulosus, Arctostaphylos tomentosa* (manzanita), and *Cneoridium dumosum.* The monotony of this assemblage is relieved here and there by individuals of *Yucca whipplei,* or by the occurrence of *Adenostoma sparsifolium,* which is taller than its common congener and is particularly conspicuous when densely loaded with its small white flowers.

A stop was made to examine the small colony of Tecate Cypress, a tree which appears to be endemic to this locality, although closely related to *Cupressus goveniana.* After having visited on the previous day the only mainland station for *Pinus torreyana,* near La Jolla, it was very instructive to see another case in which plants of ancient lineage have been stranded and localized by the crustal movements of the Pacific coast line and by the climatic changes which have undoubtedly accompanied them.

After reaching Campo we passed for more than 20 miles through rolling country in which low granitic ridges alternate with alluvial valleys. The ridges and hills still bore chaparral, and the valleys were mostly in cultivation, although a few untouched ones sufficed to show that their original vegetation had been pure stands of *Artemisia tridentata* (sage-brush). On reaching the vicinity of Jacumba, 25 miles east of Campo, the complexion of the vegetation began to change very rapidly. Both species of *Adenostoma* were left behind and the first individuals of *Covillea tridentata* (creosote bush) and *Prosopis glandulosa* (mesquite) were seen. In short the chaparral had been passed and we were in what might be termed a "bush desert". Many shrubs which had been infrequent for several miles now became more common, as *Simmondsia californica* (jojobe), *Prunus ilicifolia* (desert plum), *Juniperus californica* (juniper) and *Ephedra;* while *Quercus dumosa* was replaced by *Q. turbinella.* Representatives of the chaparral were still present in *Audibertia polystachya, Cneoridium dumosum* and *Arctostaphylos tomentosa,* while the desert aspect of the landscape was heightened by numerous striking cacti and by the shrubs *Atriplex, Lycium,* and *Krameria.*

The spot selected for our camp was doubly enjoyable by reason of the magnificent outlook over the desert below, and on account of the natural botanical garden by which we were surrounded. At an eleva-

tion of about 3000 feet, in the midst of large granite boulders, we found ourselves in an open stand of desert bushes, cacti of several types, and conspicuous blooming plants of *Nolina bigelovii*. Throughout the southwest the finest displays of cacti, and the richest vegetation and flora in general, are to be found in just such situations as this, rocky and slightly above the general level of the desert valleys. Here at our camp were to be seen the columnar *Echinocactus cylindraceus*, often six feet in height, the much-branched *Opuntia acanthocarpa*, a similar form closely related to *O. bernardina*, the low, flat-jointed *O. occidentalis* (?), the tall *O. chlorotica*, low clusters of *Echinocereus engelmannii*, and a single species of *Mamillaria*.

Down the long grade to Mountain Springs the cacti and *Nolina* continued to be the most conspicuous elements of the vegetation, together with the white-leaved *Encelia farinosa* (incienso), *Simmondsia californica*, *Hyptis emoryi*, and the green-stemmed almost leafless *Thamnosma montanum*. In the narrow cañon below Mountain Springs we saw the first plants of *Fouquieria splendens* (ocotillo, or candle-tree), a bizarre desert plant which is often supposed to be a cactus merely because it is spiny. In the sandy bed of the cañon we now saw *Chilopsis saligna* (desert willow), *Hymenoclea monogyra*,—a fine-leaved composite,— and *Dalea spinosa* (smoke-tree), the most beautiful tree of the Colorado desert. On emerging from the cañon onto the great fan of sandy alluvium which stretches down to the Imperial Valley, we found ourselves in an extremely open stand of *Covillea* and *Fouquieria*, with a poor display of cacti and an extremely scanty number of herbaceous plants,—a few individuals of *Eriogonum* and the gray and prostrate *Psathyrotes annua* being the only frequent ones.

We returned from the desert to our camping site, and on the following morning had a short time in which to enjoy that locality again. The return to San Diego was made by a different route, through Buckman Springs, Descanso and Alpine. This detour brought us to the edge of the pine forest, where *Pinus ponderosa* (yellow pine) and *P. jeffreyi* were seen growing together, accompanied by a very open stand of the chaparral shrubs. In this immediate region it is very difficult to distinguish the yellow and Jeffrey pines, which appear to be much more distinct in the northern and central part of California. The one forester of our party gave an interesting demonstration of his ability to differentiate these pines by their manner of branching and by a difference in the odor of their leaves, apparently due to the presence of a charactristic oleoresin in each of the species. Between Buckman Springs and Descanso we were treated to the sight of virgin mountain parks, gray with a uniform stand of sage-brush and surrounded by pines. This

type of landscape,—so common north and northeast of here,—is of interest because it brings into juxtaposition the commonest tree of the southwestern forests and the commonest plant of the Great Basin. As seen here in the Cuyamaca Mountains this combination is doubtless near its southernmost limit. Nearer Descanso some hills were seen which bore a heavy stand of *Adenostoma*, apparently unbroken by the occurrence of other shrubs. Throughout the return journey we saw heavier chaparral on the hills, larger oaks in the valleys, and fewer of all the xerophytic shrubs. *Yucca* was absent, and not a single plant of *Opuntia littoralis* was seen, although we had observed it up to 2000 feet on the outward trip. These facts, together with the presence of pines, indicate a substantial difference in the physical conditions of the regions traversed by the two highways. North of Descanso lies Cuyamaca Peak, about 2000 feet higher than the pass east of Campo, a circumstance which probably brings a heavier rainfall to the former locality, and explains the observed differences of vegetation.

The opportunity which was afforded us for comparing the coastal and desert slopes of the Cuyamaca Mountains emphasized the difficulty of interpreting the distributional phenomena of this region in terms of "life-zones" so extensively used by faunistic and floristic workers. Two almost wholly dissimilar assemblages of plant and animal life occupy the eastern and western slopes of these mountains, and the entire complex of physical conditions is very unlike on the two slopes.

In Southern California, as an example, the delimitation of the Lower Sonoran zone, proceeding from a basis of temperature conditions, requires the embracing of at least three very distinct floristic areas: the coastal lowlands, the Mohave desert, and the Colorado desert—with the Imperial and Coachella valleys. The fact that these areas possess dissimilar floras is not of so much importance in this connection as the fact that their plants exhibit a striking dissimilarity of habit, structure and anatomy, by reason of their adjustment to the three unlike sets of environmental conditions. After we had witnessed the transition from the chaparral west of Campo to the junipers, cacti, nolinas and desert shrubs east of Jacumba, it was difficult to realize that we were in the Upper Sonoran zone on both occasions. When we reached the edge of the desert, with its extremely open stand of *Covillea* and *Fouquieria*, it was still more difficult to realize that we had re-entered the Lower Sonoran zone, which we had traversed for a short distance on leaving San Diego.

Such considerations emphasize the fact that we should not attempt to adjust distributional areas to conform to our knowledge of any of the controlling factors, for these inconsistencies have arisen from a supposed

similarity of temperature conditions in the localities which are placed in the same life zone. A natural and useful system of areas of plant and animal life should be based upon the characters of the organisms themselves—upon the total assemblage of those physiological and anatomical characters which bring the organisms into adjustment to their environment.

By Dr. F. B. Sumner

Scripps Institution for Biological Research.

A record of my impressions on the excursion across San Diego county would, I fear, have little more scientific value than the jottings of any tourist or sightseer. To a geologist or ecological botanist this trip must have furnished unlimited possibilities of observation and interpretation. For the landscape itself consisted of nothing but geology and botany—of mountains and cliffs, of forest, chaparral and desert. But where were the animals? Doubtless the ornithologist saw a bird of interest in every tree and shrub, but there was no ornithologist in our car. A herpetologist might have recognized the occasional lizards which scurried away over the rocks on our approach. Or an entomologist might have taken much satisfaction in noting the ants or beetles which were characteristic of the various sections of our route. But few zoologists would probably have added much to their knowledge of animal life.

However, I am not arguing that such a trip is profitless, even to a zoologist whose work does not lie in any one of the special fields mentioned. If he does not learn much regarding animals, he learns a great deal regarding the world in which they live. Considered as a succession of animal *environments,* this cross-section of Southern California is surely as instructive as it is spectacular. One does not need meteorological instruments to detect the change from the cool moist air of the coast to the warm, dry atmosphere of the plateau, and thence to the scorching winds of the desert. And even in this, the dry season of the year, one could judge pretty well by the vegetation of the comparative annual rainfall of the regions traversed. One who makes this trip for the first time is given a truly startling demonstration of the screening effect of the great mountain wall in determining the aridity of the interior valley. This picture, to be sure, is not so diagrammatically clear in the neighborhood of Mountain Springs as it is in the Laguna Mountains, a little further north.

Our car was unluckily separated from the rest of the party early in the trip, but we were so fortunate as to have some most congenial associates, including two botanists and a geologist.

By Dr. J. Grinnell.

California Museum of Vertebrate Zoology.

In traversing the southern road, from San Diego past Mountain Spring, the single feature of greatest interest to me pertained to topography. Having never been through that country before, my notions of it had been derived from brief references to it in literature, and I had imagined "the coast ranges" to consist of a series of narrow ridges parallel to one another and with intervening canyons. It was a surprise, therefore, for me to find that, instead, the elevated tract, extending from the top of the Potrero grade to the edge of the abrupt desert declivity above Mountain Spring, is a plateau. As pointed out by Mr. Stephens the surface of this plateau is rolling, reminding me of the peneplain country in parts of New England. The drainage is slow and the transition from the evident north-and-south line of greatest rainfall, in the vicinity of Campo, to the edge of the Colorado Desert, thirty or forty miles beyond, is gradual.

The effects of these topographic peculiarities upon the flora and fauna are such as to bring, not an abrupt change from Pacific coast conditions to those of the Colorado Desert, but a gradual blending, beginning near Campo and still in evidence at the edge of the plateau above Mountain Spring. It was with extreme interest that I noted the disappearance here and there of Pacific coast plants and the coming in of successively more xerophilous species. With very little doubt the behavior of the birds, mammals and reptiles accords in general with that of the plants, and I could only wish for the opportunity to hunt and trap throughout the entire section, and thereby determine the facts. The few species seen in our rapid transit did not happen to be of critical sorts.

Historically, the line of our trip passed several points of special interest to the student of systematic mammalogy, namely the type localities of a number of species. I was greatly interested in seeing the kind of ground where Mearns secured the specimens from which he described his several new forms: *Peromyscus crinitus stephensi, Perognatus fallax pallidus,* and *Lepus californicus deserticola*—in the vicinity of Mountain Spring and where the topotypes of *Peromyscus eremicus fraterculus, Peromyscus californicus insignis, Perodipus streatori simulans* and *Perognathus californicus femoralis* were obtained—on a brushy mountain side near Dulzura. Since the environment prescribes in large measure the characters of a species, one can never expect to

know it well, no matter how familiar he may be with specimens in a museum, until he has seen the locality of its native occurrence.

As for life-zones of the section, my brief and superficial survey, taking into account almost altogether the more conspicuous plants, indicates the following succession from west to east. (1) Upper Sonoran zone, in the immediate vicinity of San Diego (within the range of first effects of the sea breeze); (2) Lower Sonoran zone, dilute in degree, occupying a belt from a few miles out of San Diego to the vicinity of Jamul; (3) Upper Sonoran zone again, comprising the almost continuous chaparral belt from the last named point through to the vicinity of Jacumba; (4) Lower Sonoran zone, from the broad area of gradual blending marked centrally at the last named point and beginning purely at the edge of the declivity above Mountain Springs. A noteworthy feature, another surprise to one previously familiar only with topographic maps, was the total lack along the route traversed of the faintest representation of the Transition zone. The Mexican boundary of California cuts only the Austral life zones. There is no continuous highway for Boreal species south into the mountains of Lower California.

By Prof. George D. Louderback
University of California.

It is with considerable satisfaction that I recall the enjoyable and stimulating visit to San Diego last August, which included the very successful meetings of the Scientific Societies, the charming Exposition, the Scripps Institution at La Jolla, and the U. S. S. Albatross—two agencies of scientific research, and finally, sight-seeing trips through city and county. Among the varied activities of that time, I look back with particular satisfaction on the "cross-country" excursion, both as a pleasant and exhilarating outing with most congenial companions and a most instructive display of the general geographical and geological conditions of southernmost California.

The use of automobiles for transportation naturally broke the party into small groups, and the group of which I was a member encountered a series of minor mishaps and failures of cooperation on the part of the automobile-controlling elements of the local fauna. The chief resulting disadvantage was our separation from companionship and opportunities for discussion with the larger membership of the party. On the other hand, the smaller group was a very congenial one, and the delay made it possible for most of us to take a very profitable unscheduled side trip across the Mexican border near Campo.

For the amount of time involved, the route of the excursion was excellently chosen to present a general view of the major geological features of the extreme Southwest. The main structural features of the region show an approximately north-south elongation or trend, and the trip was essentially a transverse section of these features from coast to desert, showing their succession and spacial relations to the best advantage.

General Features.—In a general way the region traversed may be divided into three parts: the coastal, the mountain, and the desert belts, and these are separated by two border or transition zones. In many ways these three belts show contrasted conditions and geological activities. But a more general and fundamental view will unite the three into a greater diastrophic province. Their histories, although different in detail or in character, have been closely bound together. Their chief periods of disturbance, or quiet, their relative elevations and lines of separation have been primarily determined by a closely related group of movements that have also determined the formal relation of ocean to continent in that region and given rise to the group of structures that, extending hundreds of miles to the south, express themselves in

the peninsula of Lower California with its adjoining water bodies on both sides.

The central or mountain belt is the dominating one of this structural group and has exerted an important influence on each of the bordering belts. It is at the same time the barrier that separates them, determining their main differences, and the link that relates them to each other. A complete understanding of the mountain belt can only be gained by a study which includes both of its bordering belts, and it is for this very reason that the plan of the excursion was so well adapted to the geologically inclined visitor—better, for example, than a much longer excursion that might have ended in the midst of the mountain belt, without reaching the border on the desert side.

The Coastal Belt.—For some miles after leaving San Diego, the most striking geological feature is the broadly developed, gently sloping or practically flat terrace or "mesa" which extends up to the mountains. It represents a surface developed in earlier times when the coastal belt lay lower with respect to the sea level than it does at the present time.

This terrace is commonly underlain by gravel with a rust-colored matrix, the original deposit laid down by the agents that shaped the old plain. This deposit conforms with the terrace surface and therefore usually forms a horizontal or slightly inclined layer which in cliff or canyon sections is seen to contrast with the underlying sandstones, shales and other rocks of the older formations whose strata usually lie more markedly inclined to the horizontal, and sometimes dip at high angles. It is evident that these older rocks (Cretaceous and Tertiary, but whose time limits have, as far as I know, not been definitely ascertained) were disturbed by various earth movements—tilting, folding, faulting—before the terrace material was laid down, and the plain of which this terrace is the remnant was originally cut across the older strata by processes of abrasion.

The "mesa" is separated from the ocean, and in many places from the valleys, by a number of narrower terraces, with intervening steeper slopes or cliffs. Along the immediate coast there is definite evidence that these terraces are raised ocean beaches; farther back, they are of stream origin. Just how large or how small areas should be apportioned between marine and fluvial abrasion was not determined, but, to a hasty view, the major portion of the broad terrace covering appeared to be the result of stream deposition, and the valley extensions of the narrower terraces are evidently of river origin.

Comparatively recent successive elevations of the coast have caused the streams to work to successively lower base-levels and the old plains

have therefore been cut into and dissected. The present cycle of erosion has not been in operation long enough for small streams to do more than cut narrow valleys, while the larger streams have started on a career of lateral corrasion and have produced valleys, in some cases, a half mile wide or more.

The whole belt is characterized by the small amount of general erosion. Even the broader valleys show steep-walled sides and one passes with great abruptness from the flat terrace floors of the divides into the trench-like valleys. Furthermore, the original terrace covering has been retained over wide areas where not actually cut out by the streams in excavating their valleys. The factors determining these phenomena are probably the original plane surface of the country into which the valleys were cut, the recency of the uplift, and especially the low precipitation and low humidity of the atmosphere.

The lower terraces apparently never occupied a large portion of the coastal belt, and at the time of their formation and maximum development were more in the nature of coastal fringes or comparatively narrow valley flood plains. But as we left San Diego, we rose onto the high terrace or dissected plateau. This gave us a broad and beautiful panorama and it would seem that at the time of its formation and maximum extent it must have occupied the whole width of the coastal belt, and probably extended farther out to sea than the present shore. At that time the country must have had the aspect of a practically unbroken low coastal plain extending from the mountains to the sea, and for many miles both to the north and south of the position of San Diego. The streams must have flowed in very shallow troughs. If those conditions had been maintained to the present, the wonderful views over the bay and along the coast that can be obtained from the Exposition grounds and from other elevated parts of San Diego would not now be available, but the railroad would have no grade to contend with such as it encounters climbing out of Soledad valley.

The Transition Zone.—As the road approaches the mountains, it enters a valley, and the relation of the coastal terraces to the range front was not well seen, but the transition appears to be abrupt. The hills rise rapidly from the level of the highest terrace, and the terrace in places extends back of the line of steep-fronted mountain salients and appears to pass into lateral valley terraces up the main streams. It is soon evident that we have passed into a region of crystalline rocks. Whether the mountain front is essentially an old development affected by later erosion and other modifying influences, possibly antedating the Tertiary or even older sediments of the coastal belt, or whether it is of more recent origin; whether it is essentially of erosive origin or was

initiated by earth movements (tectonic) is a matter worthy of careful investigation. Its general appearance would seem to indicate a structural origin in comparatively recent time, with considerable modification by erosion.

The Mountain Belt.—Within the mountain belt the road winds about along the valleys and across low divides, giving here and there glimpses or longer views of certain prominent mountains, such as San Miguel, Jamul and San Isidro, which according to the work of Fairbanks are composed of igneous types of rocks (porphyries), more resistant to erosion than the granites or the later sediments.

Wherever the rocks were exposed along our road, or where, in particular, an opportunity was given to get out and examine them more closely, they were of granite (in the general field sense) or related or genetically associated types. This held, with but few minor exceptions, along our whole course across the mountain belt and into the desert. We may look upon the mountain belt that lies between the San Diego Coast and the Imperial Valley as essentially a great granite mass, showing at its surface only subordinate exposures of rocks of unrelated types.

It has apparently been definitely established that granitic rocks of this character are products of fusion and are necessarily formed under a thick mantle of rock. If we picture the conditions at the time of the consolidation of the granites, we must imagine their upper surface to have been far below the earth's surface, and to have been succeeded upwards by a thickness of metamorphosed rock—probably several thousand feet—and finally, perhaps, by rocks, extending to the earth's surface, whose composition and texture were unaffected by the heat or material emanations of the granitic magma or by the agencies which had developed the molten mass. The evidence suggests that this granitic mass underlay a mountain area at that time. though its form and extent were probably not the same as the mountain belt of the present time. The excursion gave a good opportunity to observe how completely the original covering of the granite has been eroded, not simply along certain lines of deep stream cutting but over broad areas. In fact the original "roof" appears to have been wholly removed and with it a certain thickness of the granite itself.

This gives evidence of a very long period of erosion, one not simply long enough to cut a system of canyons or valleys thousands of feet deep, but one long enough to cut away the divides and remove in toto from some thousands of square miles, thousands of feet of the outer crust. And this necessarily long period of erosion means that the territory involved was an exposed land mass during much or all of the

period, or, otherwise stated, that it was not a depressed area receiving marine or other types of sediment.

As to the age of the formation of the granite, the excursion only gave indications that it was earlier than the observed Tertiary, but other evidence would suggest that it is at least pre-Cretaceous. As to how much earlier than the Cretaceous the granite was formed has not, as far as I know at present, been definitely determined. Certain rocks intruded by the granite farther north yielded fossils that have been referred to the Triassic. The intrusion may be as late as the late Jurassic, and thus correspond to extensive granite intrusions that are found in the Sierra Nevada.

At intervals the road climbed to more prominent divides in passing from one creek valley to another, and a broader extent of country could be seen. To the east of Campo and before the descent into the Imperial valley the country is especially open and affords good general views of the Summit region. A moderate climb to a hill not far from the road broadens the horizon still more.

The topography of the summit region proved to be of considerable interest. There is no sierra, no prominent or striking peaks rising high above their surroundings, no wild or rugged mountain scenery. The relief is quite moderate, and in distant views the hills appear to unite to give a remarkably even summit surface or plateau effect, below which lie the commonly shallow and open mountain valleys, and into which an occasional canyon is incised along the border of the summit region.

The small section of the party that was fated to stay at Warren's ranch over night, climbed up a small granite knob in the early evening. Our eyes were alternately drawn to the western horizon by the beautiful sunset, and towards the eastern horizon by the rising full moon. It was the 13th of the month, and our automobile had broken down and disconnected us from the main party, but I am sure that any misgivings that we may have had were thoroughly dispelled and replaced by a feeling of pleasure that such a remarkable scene on such a wonderful night had been made available to us. The general plateau effect was strikingly brought out, and it was this very feature of the summit region that made possible the simultaneous presentation to our view of sunset and full moon.

The dominant character of the summit region, I believe to be the result of the long period of erosion above mentioned which removed the covering from the granitic rocks. The indications are that this region was thereby reduced to a very moderate or low relief, that, in terms of geographic cycle, the topography became at least that of advanced maturity, possibly of general peneplaination. It seems probable that this

cycle occupied at least all of the Cretaceous and possibly the early Tertiary, though its limits are yet to be determined.

During the time of the production of this old surface the region of the present mountain belt must have had a much lower position with respect to sea level than it has at present. For marine sediments formed from its waste are found near San Diego, and such a topography could not be formed at a high elevation so near a base-level of efficient erosion.

The subsequent uplift of the region to its present altitude was not a continuous process. There is evidence within the mountain belt and along its edges, that it took place during several successive periods with longer or shorter periods of quiet between. Early in this history of uplift a beginning was made in the dissection and destruction of the old surface form and later movements have only tended to accelerate the destructive process. Under recent conditions of elevation and base level the streams are cutting deep canyons along the border of the mountain belt and these are extending their influence back towards or into the summit region. With the long history of attack, it is remarkable how the influence of the older surface persists in the present topography.

The Eastern Transition Zone.—At the east edge of the mountain belt, the most striking feature is the steep descent to the broad Imperial valley. From a large area of rather mild topography, we have an abrupt transition into high, precipitous and rugged slopes which in a short distance lower the surface several thousand feet, and then again an abrupt passage into the low relief—to a large extent an almost featureless floor—of the valley of the Salton Sea. The view from the upper edge of the mountains is very extensive and is most impressive. The contrasts are marked.

The mountain front is notched by canyons, and these are being extended back into the summit region. The progress of their attack and the stage of their development are among the more interesting geological features of the eastern part of the mountain belt. They are far less developed than the canyons of the western part, and have done much less damage to the earlier erosion forms. Without more definite data this might be supposed as possibly in part due to a later development of the eastern than of the western mountain slope, or to an initial west slope of the plateau surface, or a western tilt developed during uplift, that would determine longer and more effective drainage lines towards the west. It is probably dependent in part on the difference in rainfall on the east and west slopes.

It is clear that the present relations of the mountain belt and the Imperial valley, likewise of the mountain and the coastal belts could

not have obtained during the development of the advanced mature or peneplain surface of the summit region. If that were in process of formation during the Cretaceous and early Tertiary, then the present relations must have been established by differential movement of the mountain belt with respect to the desert and coastal belts since that time. The sequence of major movements and resulting conditions and activities have not been definitely determined. The evidence at hand, however, would seem to indicate that the latest movements, which resulted in physiographic relations of the elevated and depressed belts, essentially as at present, took place in rather late geological times—not earlier than late Tertiary, possibly even in early Quaternary. To its comparative recency of development, and to the arid climate are due the steepness and ruggedness of the mountain front that must be descended to reach the Imperial valley.

The Desert Belt.—We ran but a short distance out on to the valley floor, but far enough to see some of the important features of its western edge. The streams, for all their shortness of water, bring much detritus down into the valley, including very coarse material which is mostly deposited not far from the edge of the mountains. One might have expected that all the older formations of the valley would be buried from sight by the more recent detritus. But evidently the western edge of the valley itself is now in process of dissection and erosion, and shows exposures of older formations in the sides of the present stream trenches. And it is not only the streams which have their sources in the mountains that have cut such trenches. There are many small branching gulches formed by the temporary streams that result from the occasional desert rains. They work back into the old valley floor by headwater erosion from the trenches of the mountain-born creeks.

So by the side of the road we found exposed stratified sediments—shales, sandstones, etcetera—tilted up at a considerable angle. They could be traced up to and into a high ridge that extends into the desert to the north of the road (Carrizo Mountain). These rocks have been referred to the upper Miocene by Arnold. They evidently had been formed and then disturbed, tilted, folded, and faulted before the present general relations of mountain and desert were established.

Kew has pointed out that the fossils found in these beds are strikingly different in species and character of development from those found in beds of presumably the same age found in the coastal province. Only 8.5 per cent of the species are common to the two regions. The differences are of the same general nature as now found between the fauna of the shores of the Pacific Ocean and of the Gulf of California and indicate that at that time, as at present, the mountain belt existed as a

divide between the depositional basins to its west and east, and also, as at present, warmer waters existed in the eastern basin than in the western.

In the vicinity of the road, these tilted Tertiary sediments have been truncated by stream action. A fairly plane surface was cut across their edges, and on this have been deposited water-laid sands and gravels over a broad area. They here form the old valley floor which the present streams are dissecting. They are probably Quaternary in age.

These gravels which often carry rather large boulders, are made up of a variety of rock types evidently derived from the mountains. Of particular interest is the large quantity of volcanic pebbles of various types, for on the road down the mountains one may not notice volcanic rocks either in the canyon walls or in the creek detritus. But volcanic rocks do occur along the mountain front to the north and south, and near the eastern edge of the high mountain area, hills were observed with flat-lying rocks that seemed in part at least to be volcanic. These volcanic rocks, both along the range front and on the summit region, must have been much more widely spread before the erosion period that produced the gravels of the valley, and streams that were formerly flowing in lava beds have removed the volcanic covering from the surface and are now cutting into granite.

On the surface of these desert gravel beds lie many scattered pebbles and boulders that show beautifully the effect of desert polish, etching, and sometimes of the development of a surface film, although the typical desert "varnish" was not observed.

Weathering and Erosion.—In the journey across the mountains the weathering forms of the rocks, especially the granitic rocks, were constantly before us, and occasionally we had the opportunity of observing the effects more closely in road cuts or stream banks. They were typical of arid conditions. Jointage, spalling, mechanical disintegration are the controlling features. Decomposition, soil formation are relatively slight.

Rock exposures are numerous on the hillsides and even the flatter elevated slopes. Samples of the rocks taken from these surface exposures commonly show the minerals to be lustrous and but little altered in composition, but the rock may crumble in the fingers or be easily broken up with a hammer.

Here and there a surface is seen covered with large rounded rock masses, often averaging several feet or even yards in diameter, and the impression may be given of glacial erratics scattered over the surface. But a closer examination shows these to be boulders of disintegration formed in place, though sometimes slipped, rolled, or washed to a lower

position. They were nuclei in a process of spheroidal weathering, and the intervening rock material has been split off, disintegrated and carried away by wind or rain and thus these rounded blocks were left lying upon the surface. Their stages of development are sometimes well exposed in road or stream cuts. Their relation to the floor on which they rest is often shown by a vein or dike that cuts through the boulder and is continued in the bedrock at its base.

In the summit region, dome forms are often produced, the form of the hills being determined by the curving joint planes in the granite rock.

Even where the relief is moderate or low, a surprising number of bare rock surfaces are exposed. The products of disintegration must be washed, blown or slid away before plants can get a hold that might tie the slowly developing soil to the rock beneath.

Most striking were the results of the heavy storms that affected the whole region last spring. The streams had made fresh and often deep cuts, and had exposed and moved great quantities of large rocks which normally they would but flow around. Landslide scars on the hillsides were common sights, and on the higher and steeper slopes, the similar bare strips cleared of their slight coating of vegetation (lichen and brush) by the rush of the rain waters gathered into steep and narrow runways.

In the low grade stream valleys of the summit region the detritus gathers from the mountain slopes and frequently carries considerable water—often more water under ground than in the stream bed.

The biologists may be interested to note that in the struggle for existence under unfavorable arid conditions many of the streams become adapted to their environment, by developing a bed of gravel and sand through which the water may flow with a minimum effect of evaporation. The surface stream bed may to all appearances be dry and lifeless while beneath the protective covering a goodly amount of water may be moving onward towards the sea. Naturally those streams which have the better adapted themselves, have a better chance of surviving through the dry season.

Decomposition and the formation of soil is more marked in these valley bottoms. They are the favorable seats for trees and many fine large ones were observed in such situations. But on the hillsides that usually have little or no soil covering, and slight water conservation plants have a more precarious existence.

A cross country excursion is valuable in giving one a picture of a region's general features, geographic, geologic and biologic, in their

natural setting, and in exhibiting their mutual relationships. It fits one the better to understand the reports of investigations of special aspects or particular features of the territory observed. But its value is greatly enhanced if it leads to the recognition of problems for future research. And this particular excursion impressed me as especially valuable in that regard.

The territory which we had under observation has been rather neglected by geological investigators. Excellent work has been done, but only in comparatively small amount. There has been an impression that the problems were not especially inviting, that the features were of comparatively few types and somewhat monotonous. But in reality it appears to be rich in problems of most interesting types.

The physiographic history—the history of the development of the present geography—offers a most excellent field for investigation. The comparative uniformity of rock material over large areas has to a large extent freed the action of erosive agencies from the complications of the differential resistance of a multiplicity of rock types. The methods would necessarily be largely physiographic but not exclusively so. The remnants of Tertiary lavas and sediments resting on the old erosion surface of the mountain belt are apparently few in number, but offer possibilities for the discovery of evidence of important events in the history of the region, for correlating the events of the highlands with those of the lowlands, and the more accurate dating of the movements that raised the mountains above the coastal and desert belts.

Ridges rising above the general summit level with suggestive outlines seem to indicate internal movements in the mountain block that call for elucidation.

Peculiar drainage features such as are presented by the valleys about Tecate Mountain, point to events that illustrate general conditions in the physiographic history. And peculiar stream valley alignments, such as the long and straight armed cross formed by Pine, Lyons and Cottonwood creek valleys, call attention to structural features that are not otherwise apparent on a rapid trip through the field.

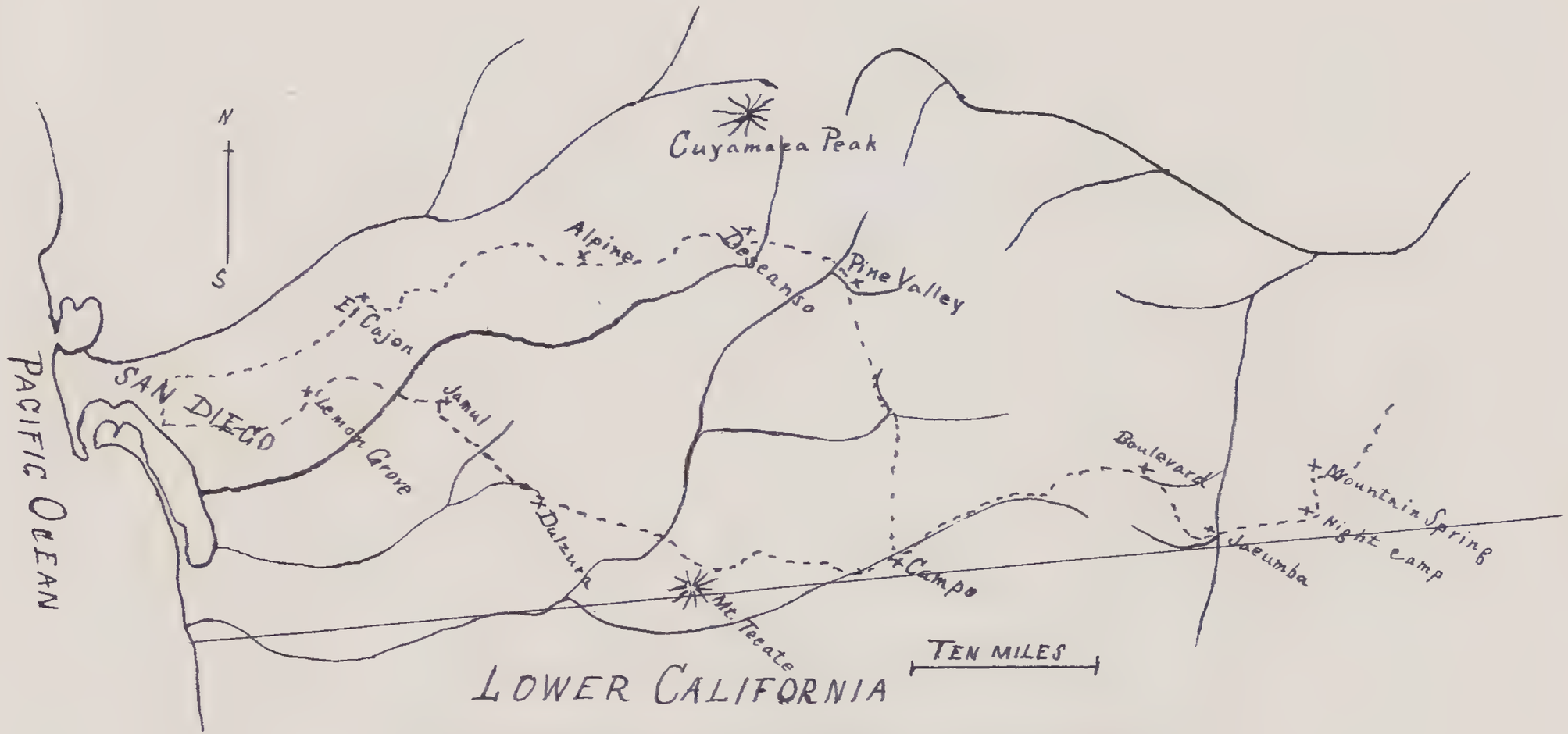
The nature of the transition zones between mountain belt and the lowland belts is still imperfectly understood. The structure, stratigraphy, and physiographic history of the lowland belts are only known in a general way.

Careful studies of the sediments in the east and west basins would undoubtedly yield facts important for the history of the basins, and also contribute to an understanding of the character and history of the adjoining mountain belt.

The history of the relations between the coastal belt and the ocean includes a field of many unsolved problems. The processes that have determined the shore line and the present configuration of the immediate coast, the origin of the submarine and off-shore features of the land and the sequence of the movements and changes that have produced them, these most interesting subjects have not as yet been carefully studied and the numerous questions to which their consideration gives rise can only be answered now in terms of possibilities.

Lastly may be mentioned the excellent field that exists for the study of forms and products of arid erosion and weathering—a study that has excited considerable interest in recent years, but yet one in which much remains to be done. All three belts would yield material for this study.

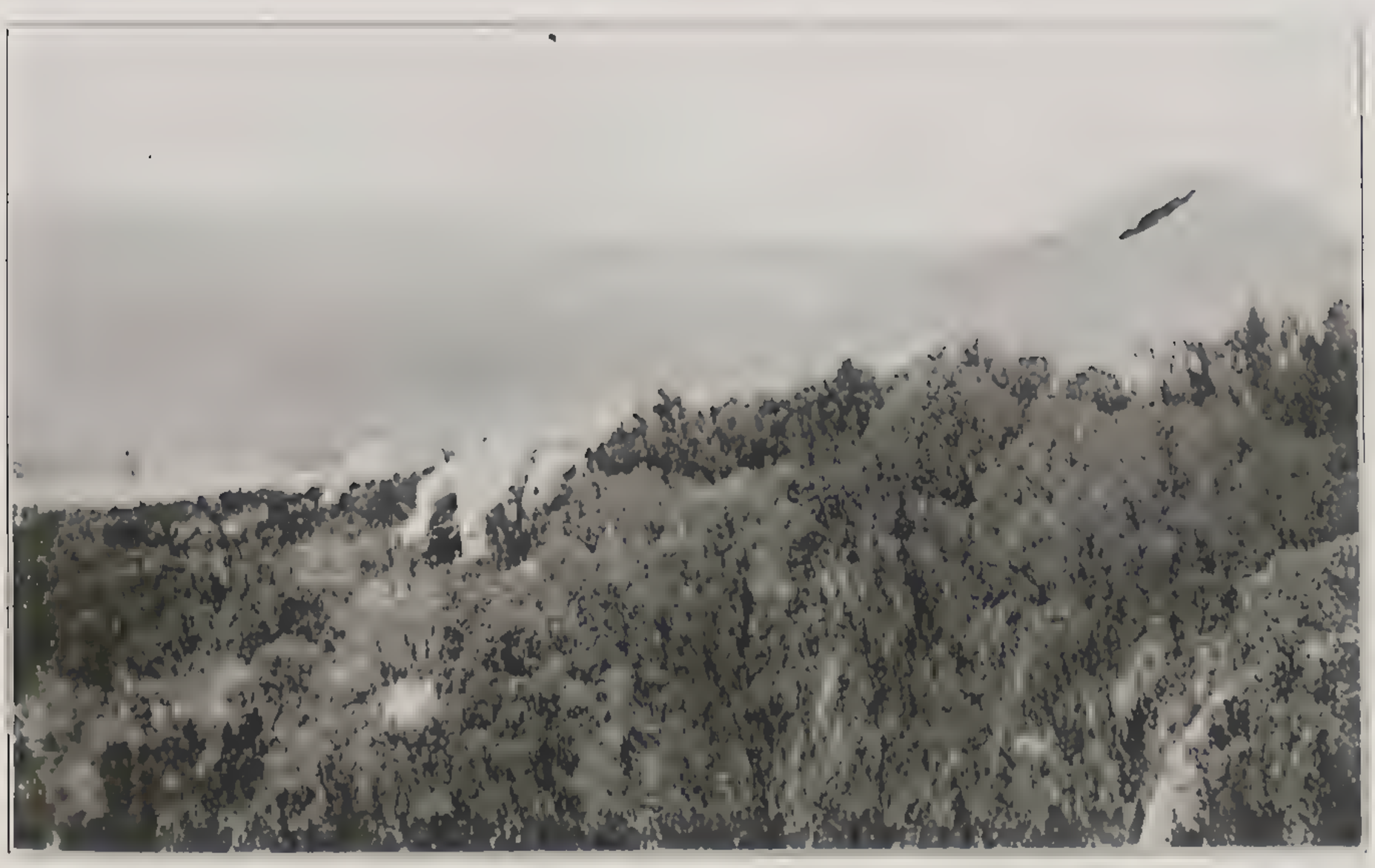
I can only hope that with the encouragement and cooperation of the San Diego Society of Natural History, and inspired by the zeal for research displayed by the small but earnest group of workers at the Scripps Institution for Biological Research, a number of serious students may become interested in the rich, and but slightly cultivated, field for geological investigation offered by the land and sea surroundings of San Diego.



SKETCH MAP OF THE REGION TRAVERSED BY THE EXCURSION.

The dotted line indicates the route followed.

OPEN STAND OF CHAPPARAL.
Altitude about 1000 feet.



CLOSED STAND OF CHAPPARAL,
near Dulzura.

TECATE CYPRESS

THE CAMP GROUND

BARREL CACTUS. "BISNAGA."
Echinocactus cylindraceus.

THE DESERT WILLOW.
Chilopsis linearis.

PINE VALLEY.